



Title	Taxonomic Study of the Subfamily Anthonominae from Japan (Coleoptera, Curculionidae)
Author(s)	Kojima, Hiroaki; Morimoto, Katsura
Citation	ESAKIA 34 p147-186
Issue Date	1994-03-24
URL	http://hdl.handle.net/2324/2573
Right	

This document is downloaded at: 2012-10-12T15:59:46Z

Taxonomic Study of the Subfamily Anthonominae from Japan (Coleoptera, **Curculionidae**)¹⁾

Hiroaki KOJIMA

and

Katsura MORIMOTO

Entomological Laboratory, Faculty of Agriculture,
Kyushu University, Fukuoka, 812 Japan

Abstract. Taxonomic study of the subfamily Anthonominae in Japan deals with 20 species in the genera *Anthonomus* and *Bradybatus* including 8 new species. These new species are *Anthonomus alni*, *A. miyakawai*, *A. uenoi*, *A. tyukyuensis*, *A. takahashii*, *A. mali*, *A. minor* and *A. okinawanus*. *Anthonomus undulatus* Gyllenhal is recorded from Japan for the first time. Keys to genera and species, diagnosis of each species, habitus photographs and line illustrations of important features are provided.

Weevils of the genera *Anthonomus* and *Brachyonyx* were first grouped together into the “Tribus Anthonomina” by Thomson (1859) and the European species were monographed by Desbrochers (1868) including the genus *Bradybatus*. This delimitation to the tribe Anthonomini has been accepted thereafter by Reitter (1912, 16), Hoffmann (1954), Dieckmann (1968), Smrecynski (1972) and many others. This taxon was upgraded to the subfamily rank by Schenkling & Marshall (1934), Morimoto (1962) and Burke (1976). Another definition to the tribe Anthonomini was given by Lacordaire (1863), who divided the “Tribus Anthonomides” into “Anthonomides vrais” and “Orchestides”. This system was followed by Leconte & Horn (1876). Much broader definition was applied to the tribe Anthonomini by Dietz (1891) and followed by Blatchley & Leng (1916). This taxon was upgraded to the subfamily rank by Voss (1958, 1962) with modification. Voss (1944) included the tribe Prionomerini and Anthonomini in the Anthonominae. The subfamily Anthonominae we applied in this study is equivalent to the tribe Anthonomini in a narrow sense as defined by Morimoto (1962) and Burke (1976).

The anthonomine weevils of Japan comprises 12 species in 4 genera on records, which have been studied fragmentally by Roelofs (1874, 75), Kôno (1939), Morimoto (1962), Voss & Chûjô

1) Contribution from the Entomological Laboratory, Faculty of Agriculture, Kyushu University, Fukuoka (Ser. 4, No. 62).

(1960) and Morimoto & Miyakawa (1985). But, the present study treats 20 species including 5 new species and a species is new to the fauna of Japan. The genus *Euphyllobiomorphus* is excluded from this subfamily by Morimoto & Kojima (1994).

Subfamily Anthbonominae

Anthonomina Thomson, 18.59, Skand. Col., I: 144.

Anthonomides vrais Lacordaire, 1863, Gen. Col., VI: 538, 575.

Anthonomidae Marseul, 1863, Cat. Col. Eur. ed. 2: 238.

Anthonominae Schenkling, 1934, Col. Cat., 139, Anthonominae: 3-4. – Morimoto, 1962, J. Fac. Agr., Kyushu Univ., 12: 34-42, 55. – Burke, 1976, Ann. Rev. Ent., 21: 283-303.

Anthonomini Reitter, 1912, Verh. nat. Verein, Brünn, LI (Best.-Tab., LXVIII, 68): 73, 74. – Dieckmann, 1968, Beitr. Ent., 17: 377-564. – Voss, 1944, Stett. Ent. Ztg., 105: 36-51.

Body pear-shaped, often elongate. Eyes more or less prominent *from* head. Rostrum slender, cylindrical, feebly curved. Fore femora as great as or a little greater than posteriors. Claws moderately divergent. Front coxal cavities continuous, even if coxae separated. Posterior margins of 2-4 ventrites straight. Aedeagus with median lobe narrowed or emarginated at the base in lateral aspect, and articulated with median struts at ventral plate. Spermatheca with lateral lobe indefinite.

Biology: The adults lay eggs generally in the flower buds or fruits, or rarely in the leaf buds, leaves and galls. The larvae feed on the plant tissue internally, completely develop in it, and pupate within the feeding cavity.

Key to Japanese Genera

- 1(2): Body elongate. Rostrum about as long as head and pronotum combined. Antennal funicle with 6 segments. Antennal scape reaching the middle parts of eyes. Male aedeagus with tegmen ringed and with a pair of parameres *Bradybatus* Germar
- 2(1): Body robust, often pear-shaped. Rostrum slender, at least as long as head and pronotum combined in general, or rarely rostrum a little shorter than head and pronotum combined in male. Antennal funicle with 7 segments. Antennal scape scarcely reaching the eyes. Male aedeagus with tegmen ringed or open dorsally, parameres absent *Anthonomus* Germar

Genus *Anthonomus* Germar, 1817

Anthonomus Germar (Type species: *Curculio avarus* Fabricius = *pedicularis* Linnaeus, subsequent designation by Dieckmann, 1969). – Schenkling & Marshall, 1934, Col. Cat., 139, Anthonominae: 9, 10. – Ter-Minassian, 1936, Trav. Inst. Zool. Acad. Sc. URSS, 3: 168-172 (in Russian). – Kôno, 1938, Ins. Mats., XIII: 76. – Voss, 1944, Stett. Ent. Ztg., 105: 40, 43. – Hoffmann, 1954, Faune de France, 59: 1102. – Voss, 1958, Decheniana, Beih. 5: 110. –

Morimoto, 1962, J. Fac. Agr., Kyushu Univ., 12: 55–56. – Kissinger, 1964, Curc. Amer. North of Mexico, Key to Genera, 54. – Dieckmann, 1968, Beitr. Ent., 17: 388–391. – Hatch, 1971, Beetles of Pacific NE., V: 345. – Angelov, 1980, Fauna Bulgarica, 10:62. – Lohse, 1983, Käf. Mitteleur., 11:97. – Dieckmann, 1988, Beitr. Ent., 38: 429.

See Schenkling & Marshall (1934) for other synonymy and references.

Body pear-shaped in general, or rarely elongate. Unci of hind tibiae smaller than those of the anteriors. Male aedeagus with parameres absent. Spermatheca comma- or C-shaped.

Anthonomus is the largest genus in the subfamily Anthonominae and predominant in the New World. The most comprehensive works of this genus were offered by Dietz (1891) for the North American species and Dieckmann (1968) for the species of western Palearctic area. Dietz divided the *Anthonomus* into 9 subgenera and many species-groups, and Dieckmann treated *Furcippus* as full genus and subdivided *Anthonomus* into four subgenera, *Anthomomus* s. str., *Paranthonomus* Dietz, *Anthonomidius* Reitter and *Persexarthus* Voss.

Furcippus is characteristic in having the bidentate femora and large scutellum, but the bidentate condition occurs parallel in some other species of *Anthonomus*. Dieckmann emphasized the biological characteristics of *Furcippus* that the larvae develop only in fruit of *Prunus* spp., whereas the larvae of *Anthonomus* live mostly in the flower buds. But, this is not unique to *Furcippus* (Burke, 1976).

Paranthonomus is a synonym of *Anthomorphus*, which was established by Weise (1883) as a subgenus of *Anthonomus* on the character of simple claws of the tarsi. Voss (1944) and Morimoto (1962) treated it as an independent genus, but Clark (1987) gave a new definition by the sulcate or impressed pygidium and regarded *Anthomorphus* as a subgenus of *Anthonomus*.

Tachypterellus had been maintained the generic rank until Burke & Anderson (1989) treated it as a poorly defined species group within the subgenus *Anthonomus*. But, it was restored as a subgenus of *Anthonomus* by the characters of the tergum, male aedeagus and spermatheca (Morimoto & Kojima, 1944).

As a result, the genus *Anthonomus* is divided into 4 subgenera, *Anthonomus* s. str., *Anthomorphus*, *Tachypterellus* and *Furcippus* in this study as in the following key.

Key to Japanese Subgenera

- 1(4):Fore femora bidentate, inner tooth more than half as long as the width of femora.
- 2(3):Elytra strongly convex, tuberculate on odd-intervals. Fore femora longest and hind femora shortest. Tergum of abdomen swollen dorsally and sclerites of tergites from first to sixth segments paired and widely separated *Tachypterellus* Fall et Cockerell
- 3(2):Elytra not tuberculate. Fore femora longest, but middle and hind femora subequal in length. Tergum of abdomen evenly or scarcely convex, sclerites not divided at least on third to sixth segments *Furcippus* Desbrochers
- 4(1):Fore femora unidentate.
- 5(6):Pygidium with longitudinal groove or deep cavity. Elytra without transverse band or pattern by setae *Anthomorphus* Weise
- 6(5):Pygidium without longitudinal groove nor deep cavity *Anthonomus* s. str.

Subgenus *Anthonomus* s. str.⁴

Key to Japanese Species

- 1(26): Fore tibiae weakly or scarcely dilated internally in the apical half. Tooth of fore femora small, its height much smaller or smaller than basal width of fore tibia in general.
- 2(3): Claws not toothed *uenoi* sp. nov.
- 3(2): Claws toothed.
- 4(7): Antennae with seventh segment of funicle short, broad and annexed to club, antennal scrobes approximate beneath and directing posteriorly against the lower edge of eyes.
- 5(6): Scales whitish, dense on lateral sides of thorax, and almost completely concealing lateral pieces of mesothorax, antescutellar white patch on pronotum conspicuous, metathorax and abdomen blackish, 1.6–1.8mm in length *okinawanus* sp. nov.
- 6(5): Scales yellowish grey, denser on lateral sides of thorax, antescutellar patch ill-defined, metathorax and abdomen brownish or often partly infusate. 2.2–2.5mm in length.
.....*okumai* Morimoto et Miyakawa
- 7(4): Antennae with seventh segment of funicle distinctly separated from club, antennal scrobes visible from side, directing posteriorly against the lower part of eyes.
- S(9): Concolorous brownish, with greyish hairy scales, which a little denser on odd intervals of elytra and forming a faint median stripe on pronotum, elytra distinctly depressed at the base of fifth striae, fifth interval connate with second and third intervals at the base and forming an arched lobe, median carina of rostrum obsolete excepting the base, 1.5–1.7mm in length *minor* sp. nov.
- 9(8): Entirely or partly blackish, or bicolorous, maculate or mottled with scales, more than 2.0mm in length.
- 10(11): Entirely concolorous black except for brownish scape of antennae, elytra evenly and sparsely clothed with whitish setiform scales, which a little closer at the base of sixth interval *mali* sp. nov.
- 11(10): Elytra and legs entirely or partly reddish brown to brownish, elytra maculate with setiform scales.
- 12(15): Tooth of fore femora as long as or longer than basal width of fore tibia. elytra mottled with blackish spots or blackish fascicles.
- 13(14): Tooth of fore femora about half as height as width of femora at broadest point, elytra brownish with subbasal, median and postmedian black spots on third and fifth intervals, usually with an indefinite greyish hairy band behind the middle, the band often bordered anteriorly and posteriorly by darker obscure bands *alni* sp. nov.
- 14(13): Tooth of fore femora more than half times as height as width of femora at broadest point, derm almost brownish, with whitish, yellowish and blackish hairy scales, blackish scales forming following fascicles: pronotum with a small pair on the middle, third interval with an

- oval and large one behind the base, conspicuous narrow elliptic one in the middle, and a dot-like one on declivity, fifth interval with two oblong ones behind the base and in the middle, and a dot-like one on subapical callus, elytra predominantly with whitish hairs on apical third *miyakawai* sp. nov.
- 15(12): Tooth of fore femora small, much less than half the width of fore femora at broadest point.
- 16(19): Tarsi robust, first segments a little longer than second, second segment transverse, pygidium almost concealed, elytra often with dark spots or dark area.
- 17(18): Elytral with black spots on fourth, sixth and eighth intervals arranged semicircularly, often these spots continuous to form complete semicircle, fore tibiae weakly expanded internally behind the middle, broadest point 1.3-1.4 times as broad as the base, slightly convex dorsally *yusai* Kôno
- 18(17): Elytra concolorous brown or often with indefinite dark area expanding externally from second interval behind the middle to side margin, fore tibiae distinctly expanded internally at basal third, broadest point 1.7-1.8 times as broad as the base, flattened dorsally.
..... *aino* Kôno
- 19(16): Tarsi slender, first segment about twice as long as broad, second segment about as long as broad, pygidium partly exposed, elytra often with subtriangular or semicircular bare or less scaled area behind the middle from second or third intervals to side margin, and the area often marginate with condensed scales or setae.
- 20(21): Elytra with two hairy bands interrupted medianly by first intervals, anterior band oblique, posterior band nearly rectangular to suture *terreus* Gyllenhal
- 21(20): Elytra each with a semicircular scaly patch open laterally behind the middle surrounding denuded area.
- 22(23): Derm clothed with oval scales on visibly whitish area, entirely concolours brown to reddish brown except for dark meso- and metathoraces *takahashii* sp. nov.
- 23(22): Derm clothed with hairy or setiform scales.
- 23(25): Derm various in colour, dark brown to blackish in general, antennae, legs and elytra entirely or partly brown, denuded area of elytra often darker than circumferent area, internal sac of penis asperate *bisignifer* Schenkling
- 25(24): Yellowish brown to reddish brown, concolours, internal sac of penis not asperate.
..... *ryukyuensis* sp. nov.
- 26(1): Fore tibiae frontly dilated internally at 1/3 from apex, fore femora with large tooth, its height greater than basal width of fore tibia.
- 27(28): Elytra with a greyish postmedian band on paler integument, the band expanded anteriorly to side, broadened anteriorly and posteriorly with chestnut brown to bark brown area, mesosternal process tongue-shaped, fore tibiae angulately dilated internally, tooth of hind femora small but distinct *pomorum* Linnaeus
- 28(27): Reddish brown except for blackish ventral side, elytra concolous, with an undulate band behind the middle, mesosternal process narrow, sharply acuminate posteriorly, fore tibiae roundly dilated internally, tooth of hind femora indistinct *undulatus* Gyllenhal

Anthonomus pomorum (Linnaeus)

Curculio pomorum Linnaeus, 1758, Syst. Nat., 10: 381.

Anthonomus pomorum: Germar, 1821, Mag. Ent., IV 323. – Schenkling & Marshall, 1934, Col. Cat., 139, Anthonominae: 21-28 (Europe, Amur, Japan, Algerien, U. S. A.(imported)). – Ter-Minassian, 1936, Trav. Inst. Zool. Acad. Sc. URSS, 3: 170, 177. – Kôno and Kim, 1937, J. Chosen Nat. Hist. Soc., 22: 22. – Kôno, 1939, Ins. Mats., XIII: 77 (J. N.: Nashi-hanazo). – Fukuda, 1951, Kaju Gaichu: 322-324 (biology, control). – Morimoto, 1962, Sci. Bull. Fac. Agr., Kyushu Univ., 19: 343 (Honshu, Korea, Siberia, Europe). – Grison & Chevalier in Blachowsky, 1963, Ent. Appl. Agr., I, Col.:1150-1166, fig. 674-683 (biology). – Nakane, 1963, Icon. Ins. Jap. Col. nat. ed. 2: 374, pl. 187, fig.27. – Dieckmann, 1968, Beitr. Ent., 18: 402-406. – Lohse, 1983, Die Käfer Mitteleur., Bd. 11, 99, fig. 106, 1. – Morimoto, 1984, Col. Jap., 4: 300, pl. 59, fig. 17. – Hoffmann, 1986, Faune de France, 59: 1116-1118, fig. 592.. – Kwon & Lee, 1986, Ins. Koreana, 6: 84. – Morimoto, 1992, Esakia, 32: 6.

This species is easily separable from Japanese congeners by the following points: Body elongate. Forehead between eyes with setiform scales branched off both sides. Fore femora thicker than posteriors, with a large triangular tooth, which is more than half as height as the width of femora at widest point. Fore tibiae curved at basal half, carinate internally, with a row of suberect setae, and dilated at apical one-third. Claw teeth sexually dimorphic, claws of fore legs toothed near apex in male, the others toothed near the base. Penis elongate, broadly membranous on ventral surface, emarginated from base to near apex on dorsal surface. Median struts almost half the length of median lobe, stout in lateral view.

See Dieckmann (1968) for morphology, Grison & Chevalier in Blachowsky (1963) for biology, and Hirano (1959) for references of biology and control in Japan.

Specimens examined: 45 exs., Niigata (Akakura); Tochigi (Nikko, Okunikko); Nagano (Sugadaira, Tadeshina, Mt. Asama).

Distribution: Japan (Honshu); Siberia; Korea; China; Europe.

Biological note: This species was recorded as a pest of apple and pear until 1940's, but is diminished thereafter by the application of modern insecticides. Adults are often captured on the flower of *Malus toringo* (Zumi in Japanese) from June to July in Japan.

Anthonomus undulatus Gyllenhal

Anthonomus undulatus Gyllenhal, 1836, in Schoenh., Gen. Spec. Curc., III, 1: 340. – Schenkling & Marshall, 1934, Col. Cat., 139, Anthonominae: 36. – Ter-Minassian, 1936, Trav. Inst. Zool. Acad. Sci. URSS, 3: 170, 177. – Hoffmann, 1954, Faune de France, 59: 1104, 1119. – Dieckmann, 1968, Beitr. Ent., 17: 436-438. – Lohse, 1983, Die Käfer Mitteleur., 11: 98, fig. 106, 108.

Rostrum without a trace of median carina. Fore tibiae dilated at a little beyond the apical one-third. Elytra more elongate, 1.6-1.7 (1.55-1.6 in pomorum) times as long as wide, a little wider than prothorax at the base. Mesosternal process narrow, sharply acuminate posteriorly.

See Dieckmann (1968) for morphology and biology.

Specimens examined: 1 ♀, Lake Tohfutsu, Abashiri, Hokkaido, 12. vii. 1989, H. Kojima leg. 1 ♀, Mt. Gorisan, Sudama, Yamanashi Pref., 30. vi. 1990, T. Nonaka leg. 1 ♀, Mt. Ohyama. Hina-ta-rindo, Kanagawa Pref., 26. ix. 1985, S. Miyakawa leg. 1 ♀, Hinoemata, Fukushima Pref., 29. v. 1988, R. Horikawa leg.

Distribution: Japan (Hokkaido, Honshu)(new record); Europe.

Biological note: A few specimens were captured on *Alnus* sp. in Japan.

Anthonomusalni sp. nov.

Derm brownish, head, apical part of rostrum, antennal clubs, meso- and metathoraces darker, funicles often darker.

Forehead between eyes with brownish, often whitish setiform scales branched off both sides, flat. Rostrum almost parallel-sided, a little longer (male) or longer (female) than head and pronotum combined; antennae inserted at about apical one-third (male) or a little beyond the middle (female) of rostrum; dorsum without median carina.

Prothorax 1.25-1.40 times as wide as long, widest at the base, or often almost parallel-sided at basal half, clothed with whitish and brownish setiform scales, whitish scales forming an indefinite longitudinal median stripe. Scutellum tongue-shaped, densely covered with whitish setiform scales.

Elytra 1.45-1.50 times as long as wide, widest at a little beyond the middle, with postmedian band and faint antemedian band by whitish setiform scales, third and fifth intervals with subbasal, median and postmedian black spots, remaining area clothed with brownish setiform scales.

Legs clothed sparsely with whitish setiform scales; fore femora with a triangular tooth, which is as long as basal width of fore tibia; fore tibiae curved at basal one-third, weakly dilated a little before the middle; claws toothed minutely at the base.

Underside clothed with whitish setiform scales, mesopleura and metepimera with brownish setiform scales.

Aedeagus with median lobe broadly membranous on dorsal and ventral surfaces, inner sac not asperate; tegmen ringed.

Length: 2.8-3.3 mm.

Holotype: ♂ (Type no.2921, Kyushu Univ.), Mt. Daisengen, Matsumae, Hokkaido, 26. vii. 1990, H. Kojima leg.

Paratypes: 1 ♀, same locality as holotype, 23. vii. 1989, H. Kojima leg. 1 ♂, Mt. Rausudake, Hokkaido, 27. vii. 1984, K. Shigematsu leg. 1 ♀, Nikko, Tochigi Pref., 11. vii. 1956, S. Kimoto leg. 1 ♀, Karuizawa, Nagano Pref., 7-14. vii. 1959, K. Morimoto leg. 1 ♀, Mt. Kisokoma, Nagano Pref., 25. viii. 1962, K. Morimoto leg. 1 ♂, Mt. Houonji-san, Katsuyama, Fukui Pref., 27. v.-1. vi.

1989, S. Zenba leg. 2 ♀♀, Kamitakara-mura, Gifu Pref., 15. ix. 1988, T. Nohira leg. 1 ♂, Kamitakara-mura, Gifu Pref., 8. viii. 1982, T. Nohira leg. 1 ♂, Takayama City, Gifu Pref., 11. vi. 1969, T. Nohira leg. 1 ♂, Mt. Ohdaigahara, Nara Pref., 26. v. 1979, H. Hiramatsu leg.

Distribution: Japan (Hokkaido, Honshu).

Biological note: Some specimens were captured on *Alnus* sp. and *Sorbus americana* (Nanakamado in Japanese).

Remarks: This species is closely related to *amygdali* Hustache, but the elytra are a little robuster (ratio of length to width is 1.55–1.60 in *amygdali*).

Anthonomus miyakawai sp. nov.

Female. Derm brown to yellowish brown.

Forehead between eyes with whitish setiform scales branched off both sides, flat. Rostrum almost parallel-sided, longer than head and pronotum combined, without median carina on dorsum; antennae inserted at a little beyond the middle of rostrum.

Prothorax 1.2–1.3 times as wide as long, widest at the base, constricted near apex, clothed with whitish, brownish and black setiform scales, whitish scales arranged in three stripes, median stripe dilated laterally and continuous to lateral stripes before the middle, blackish scales forming a pair of dot-like spots just before the middle. Scutellum oblong-oval, three times as long as broad, densely covered with whitish setiform scales and with a few dark brownish setiform scales along side margins.

Elytra 1.35–1.40 times as long as wide, widest at apical one-third, with broad postmedian band by whitish setiform scales, its anterior margin oblique from apical one-third of suture to just a little beyond the middle of side, and the posterior margin rectangular to suture; third with three fascicles of blackish setiform scales, postbasal one oval and large, median one elliptic and slender and a dot-like one on declivity, fifth interval with two oblong fascicles, one behind the base and the other in the middle, often with an additional dot-like fascicle on subapical callus, apical area behind the postmedian band predominantly with whitish setiform scales, second and fourth intervals continuous at the base.

Legs clothed with sparse whitish setae mixing a few dark setae; fore femora with a triangular tooth, which is longer than the basal width of fore tibia; fore tibiae curved at basal one-third, dilated just a little before the middle; claws toothed minutely at the base.

Underside clothed with whitish hairs.

Male. Unknown.

Length: 3.8–4.0 mm.

Holotype: ♀ (Type no. 2922, Kyushu Univ.), Yunohana, Fukushima Pref., 16. vi. 1985, T. Hattori leg.

Paratype: 1 ♀, Sakauchi, Gifu Pref., 30. iv. 1989, T. Nohira leg.

Distribution: Japan (Honshu).

Remarks: This species is conspicuous in its characteristic scaly pattern and slender scutellum.

Name is dedicated to Mr. Sumiaki Miyakawa, who first showed us this rare species.

Anthonomus uenoi **sp. nov.**

Derm reddish brown, head, rostrum, pronotum, part of elytra and legs often infusate.

Forehead between eyes with whitish or yellowish brown hairy scales branched off both sides, without median fovea. Rostrum almost parallel-sided, a little shorter or as long as (male) or a little longer (female) than head and pronotum combined, without median carina. Antennae inserted at apical one-third (male) or a little beyond the middle (female) of rostrum.

Prothorax 1.15-1.35 times as wide as long, almost parallel-sided at basal half, often widest at the base, subapical constriction weak, clothed with whitish, yellowish brown and often sparsely blackish hairy scales, whitish scales forming a longitudinal median stripe. Scutellum oval, densely covered with whitish hairy scales.

Elytra 1.40–1.55 times as long as wide, widest a little beyond the middle, clothed with whitish, yellowish brown and blackish hairy scales, odd intervals tessellate, blackish scales pronounced on first, third and fifth intervals, whitish scales forming indefinite postmedian band.

Legs clothed sparsely with whitish hairy scales; fore femora with a small triangular tooth; fore tibiae slightly dilated a little before the middle; tarsi robust, first segment a little longer than wide, second as long as wide; claws not appendiculate.

Underside clothed with whitish scales as on dorsum, second ventrite almost as long as third and fourth ventrites combined.

Aedeagus with median lobe broadly membranous on dorsal and ventral surfaces, inner sac not asperate; tegmen ringed.

Length: 2.5-3.3 mm.

Holotype: ♂ (Type no. 2923, Kyushu Univ.), Mt. Omotodake, Ishigaki Is., 18-21. iv. 1975, H. Irie leg.

Paratypes: 2♂2♀, Akuseki Is., Tokara Isls., 13. v. 1991, T. Ueno leg.; 4♂1♀, 11-12. iii. 1991, T. Ueno leg. 1 ♂, Mt. Yonahadake, Okinawa Is., 16. iv. 1991, H. Kojima leg. 1 ♀, Mt. Yonahadake, Okinawa Is., 29. vi. 1993, K. Morimoto leg. 1 ♂, Yona, Okinawa Is., 25-28. iv. 1965, S. Hirashima leg. 1 ♂, Shoshi, Okinawa Is., 23. iii. 1964, Y. Miyatake leg. 1 ♂, Izunmi, Okinawa Is., 22. iii. 1964, Y. Miyatake leg.

Distribution: Japan (Ryukyus: Akuseki-jima, Okinawa-honto, Ishigaki-jima Isls.).

Remarks: This species is characteristic in having unarmed claws and short rostrum. An adult was captured on *Prunus* sp. at Mt. Yonahadake.

Anthonomus bisignifer Schenkling

Anthonomus bisignatus Roelofs (nec Gyllenhal), 1874, Ann. Soc. Ent. Belg., 17: 162 (Japon). – Matsumura, 1931, Illustr. Comm. Ins. Jap., III: 102. – Matsumura, 1931, 6000 Ill. Ins. Jap.:

274 (fig.; Honshu). – Yuasa, 1932, Nippon Konchu Zukan: 537 (fig.; Honshu).

Anthonomus bisignifer Schenkling, 1934, Col. Cat., 139, Anthonominae: 16 (new name for *bisignatus* Roelofs). – Kôno and Kim, 1937, J. Chosen Nat. Hist. Soc., 22: 29. – Kôno, 1939, Ins. Mats., 13, 2&3: 80. – Katô, 1937, Seitaiigaku Kenkyu, III: 223. – Katô, 1938, Ouyou Doubutsugaku Zasshi, 10: 186-189. – Yuasa & Kôno, 1951, Icon. Ins. Jap., 1268, fig. 3655. – Morimoto, 1962, Sci. Bull. Fac. Agr. Kyushu Univ., 19: 343. – Nakane, 1963, Icon. Ins. Jap. col. nat. ed., II: 337, pl. 187, fig. 25 (Hokkaido, Honshu, Shikoku, Kyushu). – Morimoto, 1984, Col. Jap., 4: 300, pl. 59, fig. 18 (Hokkaido, Honshu, Shikoku, Kyushu, Saghalin, Kurile Isl.). – Kwon & Lee, 1986, Ins. Koreana, 6: 84.

Anthonomus signatus: Kinoshita & Shinkai (nec Say), 1926, Agr. Hort., Tokyo, I: 3. – Clausen, 1931, Circ. 108, U.S. Dep. Agr.: 75.

Minyrus japonicus: Matsumura (nec Roelofs), 1900, Nippon Gaichuhen, 3: 318. – Matsumura, 1905, Nippon Konchugaku, 6: 198. – Matsumura, 1906, Nippon Gaichu Mokuroku: 70. – Matsumura, 1921, Dainippon Gaichu Zensho, 3: 198. – Matsumura, 1932, Dainippon Gaichu Zusetsu: 880-881, pl. 55, fig. 12.

Minyrus albopilosus Matsumura, 1911, J. Col. Agr., Tohoku Imp. Univ., Sapporo, IV: 132.

Anthonomus albopilosus: Hori, 1933, Bull. Saghalinen Cent. Exp. Stat., Komura: 151. – Hori & Ishikawa, 1933, Byochugai Bojo Yoho, Komura: 151.

Anthonomus bisignatus albopilosus: Hori, 1937, Kontyd, XI: 234.

See Hirano (1959) for Japanese references on biology and damage.

Coloration various, head, rostrum and pronotum usually dark brownish to blackish, elytra dark red with dark denuded fascia and scutella space in general, antennae and legs entirely or partly brownish, or swollen part of femora often infusate, almost completely blackish in some specimens from northern Japan.

Forehead between eyes with whitish scales and median fovea. Rostrum almost parallel-sided from base to antennal insertion, then slightly widening to apex in female, with indefinite median carina from base to antennal insertion, a little longer (male) or longer (female) than head and pronotum combined. Antennae inserted at apical one-third (male) or a little beyond the middle (female) of rostrum.

Prothorax 1.2-1.4 times as wide as long, widest at basal one-third, or often before the base, subapical constriction weak, clothed with whitish scales and brownish setiform scales, whitish scales condensed on a median line and along side margins. Scutellum oval, densely covered with whitish scales.

Elytra 1.35-1.45 times as long as wide, broadest behind the middle, scarcely narrowed to base, with whitish semiannular patch surrounding denuded band open laterally behind the middle and basal short patch on sixth interval on each elytron, sixth to eighth intervals clothed with whitish scales, remaining area clothed with brownish setiform scales; striae with punctures larger on basal half and much broader than intervals on first to third striae. Pygidium partly exposed.

Legs clothed sparsely with whitish setiform scales; fore femora with a minute sharp tooth; fore tibiae slightly dilated at basal one-third; tarsi slender, first segment of fore tarsus about twice as long as wide; claws toothed, the tooth about half the length of claws.

Underside clothed with whitish setiform scales. Second ventrite shorter than third and fourth ventrites combined.

Aedeagus with dorsal surface broadly emarginated from base to the middle, inner sac asperate; tegmen not ringed.

Length: 1.8-3.1 mm.

Specimens examined: more than 100 exs. from Hokkaido, Aomori, Iwate, Tochigi, Gunma, Tokyo, Kanagawa, Yamanashi, Niigata, Ishikawa, Nagano, Gifu, Shizuoka, Aichi, Nara, Kyoto, Osaka, Hyogo, Okayama, Tottori, Yamaguchi, Ehime, Kochi, Tokushima, Fukuoka, Nagasaki (Tsushima), Kumamoto, and Kagoshima.

Distribution: Japan (Hokkaido, Honshu, Shikoku, Kyushu, Tsushima), Kurils, Sakhalin, Korea, Siberia.

Biological note: This is well-known as the “strawberry weevil” in Japan. But, the damage to strawberry is negligible in the modern horticultural practice. Common on *Rosa* spp., *Rubus* spp. and some other Rosaceae and often injurious to garden rose. Some specimens were captured on *Rosa rugosa* with *A. terreus* in Hokkaido.

Remarks: Some specimens from northern part of Japan is smaller in size and often darker in colour. This species is closely related to *A. signatus* from North America, but the body is slenderer and the fifth and sixth segments of antennal funicle are almost as long as broad, whereas in *A. signatus* these segments are apparently broader than long and subglobular.

Anthonomus ryukyuensis sp. nov.

Derm concolourous, brown to reddish brown, often head, pronotum, basal part and suture of elytra darker.

Forehead between eyes with yellowish grey scales and median fovea. Rostrum almost parallel-sided from base to antennal insertion, then slightly widening to apex in female, with indefinite median carina from base to antennal insertion, a little longer (male) or longer (female) than head and pronotum combined. Antennae inserted at apical one-third (male) or a little beyond the middle (female) of rostrum.

Prothorax 1.2-1.4 times as wide as long, widest at basal one-third, or often near the base, subapical constriction weak, clothed with yellowish grey scales and brownish setiform scales, yellowish grey scales condensed on a median line and along side margins. Scutellum oval, densely covered with yellowish grey setiform scales.

Elytra 1.35–1.50 times as long as wide, broadest behind the middle, scarcely narrowed to base, with yellowish grey semiannular patch surrounding denuded band open laterally behind the middle on each elytron, and sixth to eighth intervals clothed with yellowish grey scales; remaining area clothed with brownish setiform scales and yellowish grey scales sparsely; striae regularly impressed and narrower than intervals. Pygidium partly exposed.

Legs clothed sparsely with yellowish grey setiform scales; fore femora, tibiae and tarsi like as *A. bisignifer*.

Underside clothed with yellowish grey scales. Second ventrite shorter than third and fourth combined.

Aedeagus with dorsal surface broadly emarginate from base to the middle, inner sac not asperate; tegmen not ringed.

Length; 2.3-3.5 mm.

Holotype: ♂ (Type no.2924, Kyushu Univ.), Mt. Kuburadake, Yonaguni-jima Is., Ryukyus, 22. iv. 1993, H. Kojima leg.

Paratypes: 16, Hirashima, Nagasaki Pref., 3. viii. 1978, M. Ejima leg. 1♀, Katashima, Ushibuka City, Kumamoto Pref., 9. vi. 1985, I. Otsuka leg. 2♀♀, Ohshima, Nango-choh, Miyazaki Pref., 8. v. 1989, A. Nagai leg. 1♀, Cape Sata, Osumi Penn., 24. vi. 1957, H. Kamiya leg; 2♀, 2-5. v. 1958, K. Morimoto leg; 1♀, 7. vi. 1959, J. Nagao leg. 2♂♂4♀♀, Nomaie, Kagoshima Pref., 11. iv. 1962, T. Kawanaka leg. 51 exs., Koshima, Yakushima Is., 27. iii. 1991, H. Kojima leg. 7 exs., Nakama, Yakushima Is., 26. iii. 1991, H. Kojima leg. 4 exs., Akuseki Is., Tokara Is., 13. v. 1991, T. Ueno leg; 2 exs., 11-12. iii. 1991, T. Ueno leg. 4 exs., Takara-jima Is., Tokara Is., 14. v. 1991, T. Ueno leg. 1♀, Kuchinoshima, Tokara Is., 26. vi. -3. vii. 1969, H. Makihara leg. 2♂♂2♀♀, Shinmura, Amami-Oshima, 4-5. iv. 1956, S. Miyamoto leg. 1♀, Shinmura-Yuwan, Amami-Oshima, 4. iv. 1956, S. Miyamoto leg. 3♂♂2♀♀, Naze, Amami-Oshima, 27. v. 1978, T. Tsutsumi leg. 1♂1♀, Nishinakama, Amami-Oshima, 1-7. vi. 1970, H. Makihara leg. 2♀♀, Maruhatake-rindo, Amami-Oshima, 1. iv. 1073, T. Ogasawara leg. 1♂, Hatsuno, Amami-Oshima, 13-20. vi. 1963, J. Nagao leg. 1♂2♀♀, Mt. Akatsuchiyama, Amami Is., 21. iii. 1991, H. Kojima leg. 1♂, Naongawa-rindo, Amami-Oshima, 22. iii. 1991, H. Kojima leg. 1♂1♀, Mt. Yuidake, Amami Is., 19. iii. 1991, H. Kojima leg. 1♂, Naze, Amami Is., 29. iii. 1990, Y. Okushima leg. 1♂, Okinoerabu Is., Amami Is., 2. vii. 1957, M. Umebayashi leg. 2♂♂, Higa, Kume Is., 22. iii. 1977, Y. Hori leg. 1♀, Yonahadake, Okinawa Is., 8. vi. 1964, H. Irie leg. 1♀, 14. iii. 1988, T. Ueno leg. 1♀, Yona, Okinawa Is., 24. iii. 1964, S. Kimoto leg; 1♀, 14. iii. 1988, T. Ueno leg. 1♂, Shuri, Okinawa Is., 1. v. 1961, O. Nakachi leg. 5♂♂5♀♀, Mt. Omotodake, Ishigaki Is., 18-21. iv. 1975, H. Irie leg.; 1♀, 18. iv. 1990, T. Hanatani leg. 2♂♂2♀♀, Mt. Banna, Ishigaki Is., 8. iv. 1974, O. Yamaji leg. 9 exs., Takeda, Ishigaki Is., 10. iv. 1990, T. Hanatani leg. 1♂1♀, Mt. Banse, Ishigaki Is., 24. iv. 1990, T. Hanatani leg. 1♂, Mt. Yarabu, Ishigaki Is., 9. iii. 1990, Y. Okushima leg. 1♀, Hirano, Ishigaki Is., 18. iv. 1992, H. Kojima leg. 4♂♂4♀♀, Shirahama, Iriomote Is., 8. iii. 1964, Y. Miyatake leg. 1♀, 1. iv. 1962, Y. Arita leg. 1♀, Shirahama-Sonai, Iriomote Is., 8. iii. 1964, S. Kimoto leg. 1♂2♀♀, Inaba, Iriomote Is., 10. iii. 1964, S. Kimoto leg; 1♀, 10. iii. 1964, Y. Miyatake leg. 1♀, Sonai, Iriomote Is., 8. x. 1963, S. Ueno leg. 1♂, Kampiradaki, Iriomote Is., 10. x. 1963, K. Morimoto leg; 3♂♂, 20. iv. 1986, K. Kume leg. 1♀, Ushiku-mori, Iriomote Is., 9. iii. 1964, Y. Miyatake leg. 1♀, Hoshizunanohama, Iriomote Is., 31. iii. 1990, H. Kojima leg. 9 exs., Ohara-Mihara, Iriomote Is., 19. iv. 1993, H. Kojima leg. 38 exs., Kubura-Hikawa, Yonaguni-jima Is., 21-22. iv. 1993, H. Kojima leg. 26 exs., same data as holotype, H. Kojima leg; 23 exs., 23-24. iv. 1993, H. Kojima leg. 5 exs., Tendabana, Yonaguni Is., 2. iv. 1990, H. Kojima leg. 4 exs., Mt. Urabudake, Yonaguni Is., 3. iv. 1990, H. Kojima leg. 1♀, 18. ii. 1990, Y. Okushima leg.

Distribution: Japan (Kyushu, Yakushima Is., Ryukyus: Akuseki-jima, Takara-jima, Kuchinoshima, Amami-Oshima, Kume-jima, Okinawa-honto, Ishigaki-jima, Iriomote-jima, Yonagu-

ni-jima Ms.).

Biological note: This species is captured on *Rubus* spp. and often captured on the various whitish flowers.

Anthonomus takahashii sp. nov.

Derm brown to reddish brown, meso- and metatorax darker, antennal scape, funicle and legs a little lighter.

Forehead between eyes with whitish oval scales and indefinite median fovea. Rostrum almost parallel-sided from base to antennal insertion, then slightly widening to apex, with indefinite median carina from base to antennal insertion, a little longer (male) or longer (female) than head and pronotum combined. Antennae inserted at apical one-third (male) or a little beyond the middle (female) of rostrum.

Prothorax 1.3-1.4 times as wide as long, widest at basal one-third, subapical constriction weak, clothed with whitish oval scales and yellowish grey setiform scales, whitish scales condensed on an indefinite median line and along side margins. Scutellum oval, densely covered with whitish scales.

Elytra 1.27-1.28 times as long as wide, scarcely narrowed to base, almost evenly clothed with whitish oval scales excepting indefinite bare patches along the inner margin of semiannular dense area of scales behind the middle, with basal short whitish patch on sixth interval on each elytron; each interval with a row of yellowish brown setiform scales. Pygidium partly exposed.

Legs clothed with whitish setiform scales sparsely; fore femora with a minute sharp tooth; fore tibiae slightly dilated a little before the middle; tarsus robust, first segment of fore tarsi a little longer than wide; claws toothed, the tooth a little more than half the length of claws.

Underside clothed with whitish scales and setiform scales. Second ventrite a little shorter than third and fourth ventrites combined.

Length: 2.25-2.35 mm.

Holotype: ♀, (Type No. 2925, Kyushu Univ.), Lake Kutcharo, Nibushi, Hokkaido, 7. vi. 1957, M. Takahashi leg.

Paratypes: 1 ♂1♀, same data as holotype. 1♂, Maruyama, Sapporo, Hokkaido, 3. viii. 1991, K. Miyashita leg.

Distribution: Japan (Hokkaido).

Anthonomus mali sp. nov.

Anthonomus sp.: Matsumoto, 1983, Shokubutsu Boeki, 37(6): 249 (biology, control).

Derm black except for brownish scape of antennae.

Forehead between eyes with sparse whitish setiform scales and median fovea. Rostrum almost parallel-sided from base to antennal insertion, then slightly widening to apex, with median carinae

from base to antennal insertion, slightly (male) or a little (female) longer than head and pronotum combined. Antennae inserted at apical one-third (male) or a little beyond the middle (female) of rostrum.

Prothorax 1.35–1.50 times as wide as long, widest a little before the middle, subapical constriction weak, clothed with whitish setiform scales and dark setae, whitish scales condensed on a faint median line and along side margins. Scutellum oval, clothed with whitish scales densely.

Elytra 1.25–1.35 times as long as wide, broadest behind the middle, scarcely narrowed to base, clothed with whitish setiform scales sparsely and evenly, and with a basal small whitish patch on sixth interval on each elytron. Pygidium partly exposed.

Legs clothed with whitish setiform scales sparsely; front femora a little thicker than those of *A. bisignifer*, with a minute sharp tooth; front tibiae slightly dilated a little before the middle; tarsi robust, first segment of fore tarsi a little longer than wide; claws toothed, the tooth about half the length of claws.

Aedeagus with dorsal surface broadly emarginated from base to the middle, inner sac not asperate; tegmen not ringed.

Length: 2.1–2.6 mm.

Holotype: ♂, (Type No. 2526, Kyushu Univ.), Shoubara City, Hiroshima Pref., 28. iv. 1981, K. Matsumoto leg.

Paratypes: 100 exs., same data as holotype. 2 ♀♀, Takayama City, Gifu Pref., 11. v. 1968, T. Nohira leg. 1♀, Kuroishi City, Aomori Pref., 9. vi. 1979, N. Yamada leg.

Distribution: Japan (Honshu).

Biological note: This is rather rare in Japan, but is so increased its population in Hiroshima Prefecture from 1979 as to become a pest of apple buds. The host is limited to apple according to artificial breeding tests by Matsumoto.

Remarks: This species is very similar to *A. rubi*, but easily separable from it by the round apex of penis.

Anthonomusterreus Gyllenhal

Anthonomusterreus Gyllenhal, 1836, in Schoenh., Gen. Spec. Curc., III, 1: 346. – Schenkling & Marshall, 1934, Col. Cat., 139, Anthonominae: 36. – Ter-Minassian, 1936, Trav. Inst. Zool. Acad. Sc. URSS, 3: 171, 180. – Morimoto, 1960, Kontyû, 28: 115 (Hokkaido). – Dieckmann, 1968; Beitr. Ent., 17: 463–467 (Middle- and East Asia, Italy). – Morimoto, 1984, Col. Jap., IV: 301 (J. N. Hamanasu-hanazoumushi).

See Dieckmann (1968) for synonymy and biology.

Coloration various, derm dark brown to blackish, antenna1 scape and part of legs bownish, head, rostrum, undersurfaces of meso- and metathoraces and first three ventrites usually blackish, prothorax dark brownish excepting brownish anterior margin, elytra chestnut brown with infusate basal area between fifth striae in general.

Forehead between eyes with whitish or yellowish brown setiform scales and median fovea.

Rostrum almost parallel-sided from base to the antennal insertion, then slightly widening toward apex. Antennae inserted at apical one-third (male) or a little beyond the middle (female) of rostrum.

Prothorax 1.2-1.3 times as wide as long, widest a little behind the middle, subapical constriction weak, clothed with whitish and yellowish brown setiform scales, whitish scales forming three stripes in entire length, median stripe often indefinite and obsolete before the middle. Scutellum subtriangular, densely covered with whitish setiform scales.

Elytra 1.35-1.45 times as long as wide, widest at apical one-third, each interval clothed with whitish and yellowish brown setiform scales, whitish scales forming two bands with interruption on first intervals, anterior band oblique from basal 1/3 of eighth interval to apical 2/5 of second interval, posterior band almost rectangular to suture, sixth to eighth intervals clothed with whitish scales as on bands, especially on the base of sixth interval dense. Pygidium exposed, shallowly depressed in female.

Legs clothed with whitish setiform scales; femora and tibiae similar to those of *A. bisignifer*; claws toothed, the tooth a little more than half the length of claws.

Aedeagus truncated at the apex; inner sac asperated at the apex and with a small, slender sclerite.

Length: 2.5-3.6 mm.

Specimens examined: 48 exs., Sanribanya, Lake Saroma, Hokkaido, 5.viii.1959, K. Moirimoto leg. 1 ♀, Abashiri Genseikaen, Hokkaido, by rearing larvae, 28.vi (larva), 10.vii (pupate), 21.vii.1982 (new adults), S. Suzuki leg.; 1 ♂, same locality, 12.viii.1982, S. Suzuki leg.

Distribution: Japan (Hokkaido), Siberia, Mongolia, Italy.

Biological note: Many adults were captured on the flower of *Inula salicina* var. *asiatica* (Kasensō in Japanese) at Sanribanya, but *Rosa rugosa* (Hamanasu in Japanese) was confirmed as the true host by Suzuki.

Remarks: Junior author examined the holotype at the Naturhistoriska Riksmuseet, Stockholm in 1968, which is a male and the apical part of penis is protruded from the apex of abdomen.

Anthonomus minor sp. nov.

Derm concolorous brownish.

Forehead between eyes with greyish hairy scales, transversely depressed along the hind margin of eyes. Rostrum almost parallel-sided from base to the antennal insertion, then slightly thinner apically and widened at the apex, as long as or just a little longer (male) or longer (female) than head and pronotum combined. Antennae inserted a little beyond the middle of rostrum.

Prothorax 1.35-1.40 times as wide as long, widest at the base, apical constriction weak, clothed with greyish hairy scales, condensed on median line. Scutellum small, oval, covered with greyish hairy scales.

Elytra 1.30-1.35 times as long as wide, widest a little behind the middle, basal margin between scutellum and fifth interval arched above the base of pronotum and weakly convex, fifth

interval connate with second and third intervals at the base, fourth interval not reaching the base, fifth stria depressed at the base, each interval clothed with greyish hairy scales, which are a little denser on odd intervals. Pygidium exposed partly.

Legs sparsely clothed with greyish hairy scales; fore femora with a minute sharp tooth; fore tibiae slightly dilated a little before the middle; tarsi robust, first segment a little longer than wide, and second as long as wide; claws toothed, the tooth about half the length of claws.

Aedeagus truncated at the tip; inner sac asperate; tegmen ringed.

Length: 1.5-1.7 mm.

Holotype: ♂ (Type no. 2527, Kyushu Univ.), Tatsudayama, Kumamoto Pref., 20. vi. 1974, K. Morimoto leg.

Paratypes: 9.5 exs., same data as holotype; 20 exs., 13. vi. 1977, K. Morimoto leg.; 2♂♂, 3. v. 1974, K. Morimoto leg.; 1♀, 29. vi. 1974, K. Morimoto leg.; 1♂1♀, 14. vi. 1977, Z. Kuranaga leg. 1♀, Takayama City, Gifu Pref., 19. v. 1968, T. Nohira leg. 1♂, Oishiyama, Wakayama Pref. 5. v. 1982, I. Matoba leg. 1♀, Mt. Kasugayama, Nara Pref., 29. iv. 1985, K. Shigematsu leg. 1♀, Mt. Inunaki, Fukuoka Pref., 5. v. 1954, K. Morimoto leg. 1♀, Mt. Wakasugi, Fukuoka Pref., 23. v. 1954, T. Hidaka leg. 1♂, Mt. Kwaradake, Fukuoka Pref., 31. v. 1967, Y. Takakura leg. 2♀♀, Futatsukayama, Mitagawa, Saga Pref., 4. iii. 1986, S. Nomura leg. 1♀, Mt. Mifune, Takeo, Saga Pref., 16. iv. 1985, S. Nomura leg. 1♂, Obama, Nagasaki Pref., 25. ii. 1960, T. Hidaka leg. 2♂♂1♀, Mt. Yahirodake, Sasebo, Nagasaki Pref., 29. iii- 17. iv. 1990, J. Okuma leg. 1♀, Sohda, Oita City, Oita Pref., 14. v. 1980, S. Sasaki leg. 16, Kagoshima Pref., 14. vii. 1954, S. Miyamoto & Y. Hirashima leg. 1♂, Toso, Kagoshima Pref., 9. v. 1958, H. Maebara leg. 1♀, Hatsuno, Amami-Oshima Is., 13-20. vi. 1963, J. Nagano leg. 1♂, Naze, Amami-Oshima Is., 29. iii. 1990, Y. Okushima leg. 1♀, Mt. Omoto, Ishigaki Is., 23-26. vi. 1990, K. Morimoto leg. 1♀, Shirahama, Iriomote Is., 7. iii. 1964, S. Kimoto leg.

Distribution: Japan (Honshu, Kyushu, Ryukyus: Amami-Oshima, Ishigaki-jima and Iriomote-jima Isls.).

Biological note: The adults were captured on the flower of *Mallotus japonicus* and *Ligistrum japonicum* (Akamegashiwa and Nezumimochi in Japanese) in Kyushu, but true host plant is not confirmed.

Anthonomus okumai Morimoto et Miyakawa

Anthonomus okumai Morimoto et Miyakawa, 1985, *Mushi*, 50(3): 33-34.

Derm brown to reddish brown, antennal scape and legs lighter, rostrum, antennal funicle and club, often head, postmedian band of elytra, mesosternum and metepimeron, first and basal half of second ventrites dark brown.

See Morimoto et Miyakawa (1985) for description.

Length: 2.2-2.5 mm.

Specimens examined: 44 exs. including holo- and paratypes from Kanagawa (Keihin-nagasaki-Mt. Fujisan, Mt. Ougusu, Jinmuji) and Shikine Is.

Distribution: Japan (Honshu, Shikine-jima and Kozu-shima Isls.).

Biological note: This species were captured on the flower of *Quercus serrata*, *Castanea crenata* and *Cornus controversa* (Konara, Kuri and Mizuki in Japanese).

***Anthonomus okinawanus* sp. nov.**

Derm brownish to reddish brown, antennal scape lighter, head, basal median and a pair of postmedian patches of elytra darker, the latter often indefinite, rostrum often darker, meso- and metathorax and abdomen blackish.

Forehead between eyes with whitish scales and weakly depressed transversely between the hind margin of eyes. Rostrum almost parallel-sided from base to antennal insertion, then slightly narrowning to apex, without median carina, as long as head and pronotum combined. Antennae inserted a little beyond the middle (male) or the middle (female) of rostrum, scape reaching the lower edge of eyes, first segment of funicle much thicker than that of *A. okumai*, seventh segment of funicle annexed to club.

Prothorax 1.15-1.30 times as wide as long, nearly parallel-sided at basal half, subapical constriction weak, clothed with whitish hairy scales, which are dense on lateral side and forming an antescutellar patch. Scutellum small, **mat**.

Elytra 1.3-1.45 times as long as wide, broadest behind the middle, scarcely narrowed to base, clothed with sparsely whitish hairy scales except for denser anterior and posterior parts of bare dark postmedian patch.

Legs clothed with whitish hairy scales sparsely; each femur with a very minute tooth; fore tibiae slightly dilated a little before the middle; tarsi robust, first segmet of fore tarsi just a little longer than wide, claws toothed at base.

Lateral pieces of mesothorax with dense whitish scales. Underside clothed with whitish setae **sparsely**.

Aedeagus broadly membranous on dorsal and ventral surfaces, inner sac not asperate; tegmen **ringed**.

Length: 1.6-1.8 mm.

Holotype: ♂ (Type no. 2928, Kyushu Univ.), Omotodake, Ishigaki Is., 16. iii. 1964, S. Kimoto leg.

Paratypes: 1.5 exs., same data as holotype, S. Kimoto and Y. Miyatake leg. 16, Nishinakama, Amami-Oshima Is., 24-25. v. 1978, T. Tsutsumi leg. 1♀, Nangawa-rindo, Amami-Oshima Is., 20. iii. 1991, H. Kojima leg. 1♂, Yonahadake, Okinawa Is., 21. v. 1978, H. Makihara leg. 1♂, **Kaara-yama**, Ishigaki Is., 14. iii. 1964, Y. Miyatake leg. 1♂, Mt. Omotodake, Ishigaki Is., 18-21. iv. 1975, H. Irie leg.; 1♀, 8-11. iv. 1975, H. Irie leg.; 1♂, 7. iv. 1990, H. Kojima leg. 1♀, 2. v. 1989, M. Masumoto leg. 1♂, Nakaragawa, Iriomote Is., 5. x. 1963, K. Morimoto leg. 1♂, Ushiku-mori, Iriomote Is., 11. iii. 1964, Y. Miyatake leg. 1♀, Shirahama, Iriomote Is., 5. v. 1974, H. Irie leg. 4♀♀, Mt. Lalashan, Taiwan, 4. iv. 1991, H. Kojima leg.

Distribution: Japan (Ryukyus: Amami-Oshima, Okinawa-honto, Ishigaki-jima and Iriom-

ote-jima Isls.); Taiwan.

Remarks: This species is very close to *A. okumai*, but is smaller, and scales are broader and denser.

Anthonomus aino **Kôno**

Anthonomus aino Kôno, 1939, Ins. Mats., XIII: 77-78 (Type locality; Hokkaido: Sapporo). –

Kôno, 1951, Icon. Ins. Jap.: 1267, fig. 3653. – Morimoto, 1984, Col. Jap., IV: 300, pl. 59, fig. 16 (Hokkaido, Kyushu).

Derm reddish brown, often brown. Elytra often with indefinite dark postmedian marking.

Forehead between eyes with greyish suberect setiform scales, with median fovea. Rostrum slightly (male) or a little longer (female) than head and pronotum combined, without median carina. Antennae inserted just a little beyond the middle (male) or in the middle (female) of rostrum.

Prothorax 1.3–1.5 times as wide as long, widest at the base, subapical constriction weak, evenly and sparsely clothed with greyish setiform scales. Scutellum small, tongue-shaped, convex.

Elytra 1.3–1.5 times as long as wide, widest a little behind the middle, sparsely clothed with greyish setiform scales, which are often a little denser around the dark area, sparingly with a row of recumbent black fine setae on each interval.

Legs clothed with suberect greyish setiform scales; fore femora with a minute dull tooth; fore tibiae stout, dilated at basal 1/3, a little wider than rostrum at this point; tarsi robust, first segment just a little longer than wide, second as long as wide.

Underside clothed with greyish setiform scales. Front coxae narrowly separated. Second ventrite a little shorter than third and fourth combined.

Aedeagus with median lobe with broadly membranous on dorsal and ventral surfaces, inner sac with setiform spines at the apex; tegmen ringed.

Length: 3.0–3.3 mm.

Specimens examined: 6 exs., Ashoro, Tokachi, Hokkaido, 24–31. vii. 1959, K. Morimoto leg. 3 exs., Kurifuji, Yabe, Kumamoto Pref., 9. v. 1977, K. Morimoto leg.

Distribution: Japan (Hokkaido, Kyushu).

Biological note: The adults were captured on the seeds of *Ulmus propinqua* (Harunire in Japanese)*

Anthonomus yuasai **Kbno**

Anthonomus yuasai Kôno, 1939, Ins. Mats., XIII: 79–80 (Honshu). – Kôno, 1951, Icon. Ins. Jap.: 1268, fig. 3655. – Nakane, 1963, Icon. Ins. Jap. Col. nat. ed, II: 374, pl. 187, fig. 26

(Honshu, Shikoku, Kyushu). – Morimoto, 1984, Col. Jap., IV: 301, pl. 59, fig. 19. – Kwon & Lee, 1986, Ins. Koreana, 6: 85. – Morimoto, 1992, Esakia, 30: 6.

Dorsum predominantly brown to reddish brown, head, coxae, meso- and metathorax and first ventrite black, rostrum blackish on the underside and apex, pronotum often infusate medianly,

elytra with dark spots on fourth, sixth and eighth intervals, these spots often continuous semiannularly.

Forehead between eyes with greyish hairy scales, with a faint median fovea. Rostrum a little longer (male) or longer (female) than head and pronotum combined, with indefinite median carina from base to the antennal insertion. Antennae inserted a little before the middle (female) or apical third (male) of rostrum.

Prothorax 1.35-1.50 times as wide as long, widest at the base, clothed evenly with greyish hairy scales, without scaly stripe. Scutellum subtriangular, densely covered with greyish scales.

Elytra 1.45-1.55 times as long as wide, widest a little behind the middle, sparsely clothed with greyish hairy scales, which are often a little denser along exterior margin of dark annule, and often denser also on the inside area of the annule and apical part of elytra. Pygidium almost concealed.

Legs clothed with greyish hairy scales; fore femora with a small dull tooth; fore tibiae widest a little behind the middle, as wide as rostrum at this point; tarsi robust, first segment a little longer than wide, second as long as wide.

Underside clothed with greyish hairy scales. Front coxae separated narrowly each other. Second ventrite shorter than third and fourth combined.

Aedeagus with median lobe membranous on dorsal and ventral surfaces, inner sac asperate near the apex; tegmen ringed.

Length: 2.5-3.4 mm.

Specimens examined: 80 exs., Akita (Ohta-machi); Gunma (Kirizumi-Spa); Tokyo (Takao, Oume); Chiba (Mt. Kiyosumi); Kanagawa (Mt. Futagoyama, Minamiashigara); Niigata (Kurokawa, Senami, Murakami, Takane); Ishikawa (Mt. Takasuyama); Gifu (Mino); Shiga (Mt. Ibuki); Osaka (Mt. Myoken, Mino, Hatsutani); Tottori (Mt. Daisen); Ehime (Omogokei); Fukuoka (Mt. Hikosan, Mt. Tachibana, Mt. Fukuchi, Mt. Wakasugi); Nagasaki (Tsushima); Kumamoto (Kikuchi-suigen).

Distribution: Japan (Hokkaido, Honshu, Shikoku, Kyushu, Tsushima); Korea.

Biological note: The adults were captured on *Zelkova serrata* (Keyaki in Japanese).

Subgenus *Anthomorphus* Weise, 1883

Anthonomus subg. *Anthomorphus* Weise, 1883, Deut. Ent. Zeit., 27: 255 (Type species: *Anthonomus varians* Paykull, monobasic). – Schenkling & Marshall, 1934, Col. Cat., 139, Anthonominae: 13. – Hoffmann, 1954, Fn. Fr., 59: 1103. – Clark, 1987, Quaest. Ent., 23: 318 (= *Paranthonomus*; revision).

Anthonomus subg. *Paranthonomus* Dietz, 1891, Trans. Am. Ent. Soc., XVIII: 199 (Type species: *Anthonomus profundus* LeConte, by original designation). – Dieckmann, 1968, Beitr. Ent., 17: 470 (= *Anthomorphus*). – Smreczynski, 1972, Kluz. Oznac. Owad. Polski, XIX, Coleopt. 98d: 117, 127.

Anthomorphus: Voss, 1944, Stett. Ent. Zeit., 105: 40, 48. – Morimoto, 1962, J. Fac. Agr., Kyushu

Univ., 12: 56.

This subgenus was well revised by Clark, 1987, including our *A. varians*.

***Anfhonomus (Anthomorphus) varians* (Paykull)**

Curculio varians Paykull, 1792, Monogr. Curc. Sueciae: 16 [Suecia].

Anfhonomus varians: Germar, 1821, Mag. Em., IV: 324. – Morimoto, 1984, Col. Jap., IV 300, pl. 59, fig. 1.5 (Hokkaido).

Anfhonomus (Anthomorphus) varians: Weise, 1883, Deut. Ent. Zeit., 27: 255. – Schenkling & Marshall, 1934, Col. Cat., 139, Anthonominae: 13. – Clark, 1987, Quaest. Ent., 23: 329.

Anfhonomus (Paranthonomus) varians: Dieckmarm, 1968, Beitr. Ent., 17: 472, 473.

Anthomorphus (Anthomorphus) varians: Voss, 1944, Stett. Ent. Zeit., 105: 40, 48.

Anthomorphus varians: Morimoto, Kontyû, 28: 115 (Hokkaido; *Pinus pumila*).

See Schenkling & Marshall, 1934, for synonymy, and Dieckmann, 1968 and Clark, 1987 for taxonomy and biology.

This species is easily recognized from the others by the following combination of characters: Glossy, elytra without any bands nor marking, with sparse setae; claws simple, not toothed; pygidium with a longitudinal deep sulcus in both sexes; fifth ventrite subtrapezoidally emarginate at posterior margin in male, with an oval depression at the middle in female.

Coloration various; two types are present in Japan: Type I (29 examples): Head, coxae, pro-, meso- and metasterna and abdomen black, the rest reddish brown, apex of rostrum, tarsi and claws often infusate. Type II (Two examples): Head, rostrum, thorax, scutellum, legs and abdomen black, elytra reddish brown with black suture and lateral margins.

Length: 3.3-3.6 mm.

Specimens examined: 31 exs., Hokkaido (Yuohzan, Yamabe, Numanodaira); Iwate (Mt. Hayachine); Niigata (Mt. Tairappyo); Gifu (Sengendaru-kohgen).

Distribution: Japan (Hokkaido, Honshu), Russia, Europe.

Biological note: The adults cause the defoliation of *Pinus strobus* by feeding the needles in Hokkaido. The adults were also obtained from *Pinus pumila* and *Abies sachalinensis* by beating and one adult was found in the male flower of *Pinus pumila*.

Subgenus *Tachypterellus* Fall et Cockerell, 1907

Tachypterellus Fall et Cockerell, 1907, Trans. Am. Ent. Soc., 33: 214 (Replaced name for *Tachypterus* Dietz). -- List, 1932, Bull. Colo. Exp. Stn., (385): 18. – Schenkling & Marshall, 1934, Col. Cat., 139, Anthonominae: 6. – Voss, 1944, Stett. Ent. Zeit., 105: 39. – Morimoto, 1962, J. Fac. Agr., Kyushu Univ., 12: 56. – Kissinger, 1964, Curc. Am. N. Mexico, Key to Genera: 53, 55. – Arnett, 1971, Beetles of U. S., 984, 1005. – Hatch, 1971, Beetles of Pacific NW., V: 341, 343.

Tachypterus Dietz (nec Guér., 1891, Trans. Am. Ent. Soc., XVIII: 186 (Type species: *Anthonomus quadrigibbosus* Say, by original designation). – Blatchley & Leng, 1916, Rhynch. weevil N. E. America, 275,285.

Anthonomus (*Anthonomus*) a species group Burke & Anderson, 1989, Ann. Ent. Soc. Amer., 82: 427.

Anthonomus (*Tachypterellus*): Morimoto & Kojima, 1994, Memorial Issue of the late Dr. Baba (in press).

Tachypterellus is treated here as a valid subgenus as discussed elsewhere on the following characters: Antennal scrobes curved, approximate beneath and directed against the lower angles of eyes, often obsolete or indefinite excepting the base; rostrum with a longitudinal groove on each side along dorsal margin of scrobe; antennae with first segment of funicle long, about as long as four following segments combined; scutellum convex, oval or subconical; elytra strongly convex, tuberculate on odd-intervals, with the base more or less produced anteriorly above the base of pronotum between scutellum and fourth stria; femora bidentate; tibiae uncinata, uncus of hind pair often minute; pygidium concealed; second ventrite about as long as first behind coxa and much shorter than third and fourth combined, fifth ventrite narrowly truncate at apex in male.

Anthonomus (*Tachypterellus*) *dorsalis* (Voss et Chûjô)

Tachypterellus dorsalis Voss et Chûjô, 1960, Niponius, I(3): 4 (Holotype: Mt. Yakemine, Niigata Pref.). – Morimoto, 1979, in Baba ed., Ins. Niigata Pref.: 36 (Niigata Pref.). – Morimoto, 1984, Coleopt. Jap., IV: 300, pl. 59, fig. 14 (Honshu).

Anthonomus dorsalis: Burke & Anderson, 1989, AM. Ent. Soc. Am., 83: 436.

Reddish brown, often infuscate at swollen parts of femora; derm thinly clothed with greyish or white setiform scale, scale denser and forming three stripes on pronotum, one stripe just below the side margin of pronotum and one stripe along outer margin of procoxal cavity on each side, scales very dense on the side pieces of meso- and metathoraces, a little denser and forming a transverse band on the middle of pronotum and a stripe on first interval basal to the tubercles.

Head slightly constricted behind eyes, frons with an indefinite narrow fovea; rostrum with a median and two pairs of lateral carinae from the base to antennae; antennae inserted at 1/3 from apex in male, 2/5 from apex in female.

Prothorax 4/5 times as long as broad, sides slightly narrowing anteriorly from the base to apical third. Scutellum convex, subconical, highest just behind the middle, with dense setiform scales.

Elytra about 2/3 times as broad as long, slightly dilated from humeri to the middle, then evenly rounded posteriorly to conjoint apices, covering entire pygidium; first interval gradually convex from a little behind scutellum to the obtuse median tubercles near apex, third interval with a large conical tubercles behind the middle, fifth interval with a small sharp tubercles at its apex.

Fore legs longest, fore femora bidentate, inner tooth sharp, about half as long as width of femur at broadest point, outer tooth much smaller and obtuse, middle and hind femora unidentate;

tibiae almost straight externally excepting basal 1/3, fore tibiae weakly widened internally in the middle, all tibiae uncinat, often uncus vestrigial in female on hind pair; tarsi rather robust, second segment about as long as broad; claws with teeth reaching their mid point.

Length: 2.7–3.2 mm.

Specimens examined: 18 exs., Akita (Iwamimitsunai); Niigata (Niitsu, Mikuni-pass, Kurokawa, Senami, Renge-onsen); Ishikawa (Mt. Horyu); Gifu (Nakatsugawa); Kyoto (Ohmi, Ohara).

Distribution: Japan (Honshu).

Biological note: The adults were captured on the flower of *Prunus grayana* (Uwamizuzakura in Japanese) from the middle of May to July.

Note: This species is closest to *A. quadrigibbosus* of North America, but is separable by the following points:

A. quadrigibbosus: Outer teeth of fore femora pointed, fore tibiae strongly dilated internally in the middle, elytra with first interval weakly convex and not tuberculate, and prosternum with distinct submarginal transverse furrow before coxae.

A. dorsalis: Outer teeth of fore femora obtuse and small, fore tibiae weakly dilated internally in the middle, elytra with first interval distinctly tuberculate in the middle, and prosternum with submarginal furrow indefinite.

Subgenus *Furcipes* Desbrochers, 1868

- Anthonomus* subg. *Furcipes* Desbrochers, 1868, Ann. Soc. Ent. Fr., 4 (VIII): 413, 414 (Type species: *Anthonomus rectirostris* (Linnaeus), by original designation. – Schenkling & Marshall, 1934, Col. Cat., 139, Anthonominae: 10, 11. – Kôno, 1939, Ins. Mats., XIII: 76.
- Anthonomus* (*Furcipes*): Bedel, 1884, Fn. Coleopt. Bassin Seine VI: 128 (Subsequent emendation). – Voss, 1944, Stett. Ent. Zeit., 105: 46. – Hoffmann, 1954, Fn. Fr., 59: 1102.
- Furcipes*: Reitter, 1912, Verh. nat. Verein, Briinn, LI (Best.-Tab., 68): 74. – Reitter, 1916, Fn. Germ., V: 190. – Ter-Minassian, 1936, Trav. Inst. Zool Acad. Sc. URSS, 3: 167, 168.
- Furcipes*: Burke & Ahmad, 1967, Ann. Ent. Soc. Am., 60: 1152–1155. – Dieckmann, 1968, Beitr. Ent., 17: 386, 498. – Smrzynski, 1972, Kluz. Oznac. Owad. Polski., XIX, Coleopt. 98d: 116, 128.

Anthonomus (*Furcipes*) *rectirostris* (Linnaeus)

- Curculio rectirostris* Linnaeus, 1758, Syst. Nat., ed. X: 383 (Europe).
- Anthonomus* (*Furcipes*) *rectirostris*: Desbrochers, 1868, Ann. Soc. Ent. Fr., 4 (8): 416. – Kôno, 1929, Ins. Mats., XIII: 76 (= *bifasciatus* Toyoshima; Hokkaido, Honshu, Kuriles).
- Anthonomus* (*Furcipes*) *rectirostris*: Bedel, 1884, Fn. Coleopt. Bassin Seine, VI: 128. – Kôno, 1935, Ins. Mats., IX: 102 (Etorofu I., Hokkaido, Honshu).
- Anthonomus rectirostris*: Morimoto, 1962, Sci. Bull. Fac. Agr., Kyushu Univ., 19: 343 (Hokkaido,

Honshu, Shikoku, Kyushu, Korea, Siberia, Europe). – Nakane, 1963, Icon. Ins. Jap. col. nat. ed. II: 374, pl. 187, fig. 28. – Morimoto, 1984, Coleopt. Jap., IV: 301, pl. 59, fig. 20 (Host: seed of *Prunus donarium* and *P. avium*). – Kwon & Lee, Ins. Koreana, 6: 84, 85. – Morimoto, 1992, Esakia, 30: 6.

Furcipes rectirostris: Reitter, 1916, Fn. Germ., V: 190.

Furcipes rectirostris: Burke & Ahmad, 1967, Ann. Ent. Soc. Am., 60: 1152-1155.

Anthonomus bifasciatus Toyoshima (nec Matsumura), 1926, J. Plant. Protect., Tokyo, XIII: 449 (Biol., *Prunus avium*). – Oishi, 1927, J. Plant. Protect., Tokyo, XIV: 693 (Biol.). – Takahashi, 1930, Kaju Gaichu Kakuron, II: 611 (Biol., *Prunus avium*).

See Schenkling and Marshall (1934) for synonymy, and Dieckmann (1968) for synonymy, morphology and biology in Europe.

Reddish brown, with greyish to yellowish brown hairs condensed to form subbasal and postmedian broad bands, the former prolonged anteriorly to the base on third, fifth and seventh intervals. Fore femora bidentate, outer tooth finely externally. Scutellum large, oblong-oval, convex, rugosely punctate, with sparse hairs.

Length: 3.2-5.1 mm.

Specimens examined: 32 exs., Hokkaido (Bibai, Mt. Daisengendake); Aomori (Hachinohe); Tochigi (Oku-nikko); Fukushima (Yunohana); Tokyo (Mt. Takao); Yamanashi (Mt. Gorisan); Niigata (Kurokawa); Nagano (Yatsugatake); Kyoto (Mt. Kurama); Fukuoka (Mt. Wakasugi, Kurume, Mt. Hikosan); Ohita (Daisen-rindo); Kumamoto (Siiya-toge).

Distribution: Japan (Hokkaido, Honshu, Shikoku, Kyushu), Korea, Kuriles, Russia, Europe.

Biological note: This species was recorded as a pest of cherry in Aomori Pref., but is diminished in cherry orchard since the application of modern insecticides from 1950's. The adults were obtained from the seeds of *Prunus avium*, *sargentii* and *donarium* in Japan by rearing. The adults appear in the late June to July and lay eggs in the sarcocarp of *Prunus avium* in Aomori. The larvae cause the rot and fall of cherry by feeding the sarcocarp and seeds, and pupate in it.

Remarks: The scutellum in this species is variable in size and shape irrelevant to sexes and localities, and is by no means larger than the other species of the genus in the smallest case.

Genus *Bradybatus* Germar, 1824

Bradybatus Germar, 1824, Ins. Spec. Nov., 1: 305 (Type species: *Bradybatus creutzeri* Germar, by original designation). – Schoenherr, 1826, Curc. disp. meth.: 234. – Schoenherr, 1836, Gen. Sp. Curc., III, 1: 331. – Lacordaire, 1863, Gen. Col., VI: 577, 581. – Desbrochers, 1868, Ann. Soc. Ent. Fr. (4)VIII: 338, 459. – Desbrochers, 1892, 1893, Frelon, II: 106, 116 (1892); 148, 158 (1893). – Reitter, 1912 (1913), Verh. Nat. Ver. Brünn, LI (Best.-Tab. 68): 74. – Penecke, 1926, Wien. Ent. Zeit., 43: 1. – Hustache, 1931, Ann. Soc. Ent. Fr., C: 255, 271. – Schenkling & Marshall, 1934, Col. Cat., 139, Anthonominae: 64-65. – Morimoto, 1962, J. Fac. Agr., Kyushu Univ., 12: 5.5. – Dieckmann, 1968, Beitr. Ent., 17: 510-542.

This genus comprises two subgenera, *Bradybatus* and *Nophops*, and the former occurs in our

fauna.**Subgenus *Bradybatus* s. str.**

Body elongated. Rostrum not longer than head and pronotum combined. Antennal scrobes oblique, running posteriorly to the underside of rostrum. Antennal funicle visibly 6-segmented, 7th segment completely annexed to club, and discriminated from club by faint constriction and setal arrangement, scape reaching the lower part of eye. Elytra more than 1.6 times as long as wide. Pygidium almost concealed. Legs robust, femora often with a minute tooth; tibiae slightly dilated internally in the middle, hind tibiae uncinat as on anteriors; claws toothed. Aedeagus with tegmen ringed, with a pair of developed parameres. Spermatheca J-shaped.

Key to Japanese Species

- 1(2): Entirely black excepting brownish scape of antennae and unci of tibiae, without any scaly patch except for an indefinite antescutellar spot on pronotum and greyish scutellum, elytra sparsely with a row of fine setae on each interval *sharpi* Toumier
- 2(1): Elytra black with broad brownish limbus, often entirely brownish, antennae, anterior margin of prothorax and bases of femora brownish, tibiae and tarsi often brownish, pronotum with greyish median stripe, elytra with indefinite postmedian oblique band formed of greyish hairy scales, the same scales denser on declivity *limbatus* Roelofs

***Bradybatus limbatus* Roelofs**

Bradybatus limbatus Roelofs, 1875, Ann. Soc. Ent. Belg., 18: 191. – Schenkling & Marshall, 1934, Col. Cat., 139, Anthonominae: 66. – Morimoto, 1962, Sci. Bull. Fac. Agr., Kyushu Univ., 19: 342 (Hokkaido, Honshu, Shikoku, Kyushu). – Nakane, 1963, Icon. Ins. Jap. Col. nat. ed., II: 374, pl. 187, fig. 29. – Morimoto, 1984, Col. Jap., 4: 300, pl. 59, fig. 13. – Kwon & Lee, 1986, Ins. Koreana, 6: 84.

Derm black, antennal scape, anterior margin of prothorax and bases of femora brownish, elytra black with brownish lateral and posterior margins in general, often entirely brownish, often tibiae and tarsi brownish.

Head clothed with yellowish setiform scales, forehead between eyes without median fovea. Rostrum almost parallel-sided, with three rows of yellowish setiform scales on each side on basal half. Antennae inserted just a little before the middle (male) or into the middle (female) of rostrum.

Prothorax 1.2-1.3 times as wide as long, almost parallel-sided at basal two-third, constricted near apex, dorsum densely punctate, each puncture with a yellowish hairy scale, which condensed on a median line. Scutellum oval, densely clothed with yellowish grey scales.

Elytra 1.70-1.75 times as long as wide, nearly parallel-sided from base to apical one-third, with bare transverse band a little behind the middle, clothed with yellowish grey hairy scales, which condensed to form an oblique band before the middle and on declivity.

Legs clothed with yellowish hairy scales; fore femora with a minute tooth, often indefinite as on the posterior pairs.

Length: 2.9-3.8 mm.

Specimens examined: 100 exs., Hokkaido (Mikasa, Nopporo, Ashoro, Oshima, Aizankei), Akita ("Chokai-mura"); Tochigi (Mt. Shibakusayama); Tokyo (Takao); Ishikawa (Iwama Spa) Niigata (Sado Is., Iwafune, Hayakawa, Mt. Shinbodake, Tsugawa, Urasa, Awashima Is.); Fukui (Tsuruga); Yamanashi (Mt. Fuji, alt. 2300m), Nagano (Oiwake), Shizuoka (Umegashima); Osaka (Minoo-Takayama); Tottori (Mt. Daisen); Saga (Mt. Taradake)

Distribution: Japan (Hokkaido, Honshu, Sado Is. Awashima Is., Shikoku, Kyushu).

Remarks: This species is very closely related to *B. kellneri* and *creutzeri*, both from Europe, but the rostrum is parallel-sided and the scales on elytra are not regularly disposed.

Biological note: This species are captured from *Acer* spp. with *B. sharpi* from May to July.

Bradybatus sharpi Tournier

Bradybatus sharpi Tournier, 1873, Mittheil. Schweiz. Ent. Ges., 4: 180. – Penecke, 1926, Wien. Ent. Zeit., 43: 3. – Schenkling & Marshall, 1934, Col. Cat., 139, Anthonominae: 67. – Morimoto, 1962, Sci. Bull. Fac. Agr., Kyushu Univ., 19:342 (Honshu, Shikoku, Kyushu, Siberia). – Dieckmann, 1968, Beitr. Ent., 17: 514. – Morimoto, 1984, Col. Jap., 4: 300, pl. 59, fig. 12. – Kwon & Lee, Ins. Koreana, 6: 84.

Magdalis albolineatus: Zherikhin, 1973, Trudy biol.- pochrenn, Inst., Vladivostok, 7 (110): 23.

Entirely black except for brownish scape of antennae and unci of tibiae. Forehead between eyes wrinkled punctate, without median fovea. Rostrum almost parallel-sided from base to the antennal insertion, then slightly thinner apically in female, with indefinite median carina on basal half, as long as pronotum, slightly shiny before the antennal insertion in female. Antennae inserted just a little beyond the middle (male) or the middle (female) of rostrum.

Prothorax 1.2-1.3 time as wide as long, widest at the base, constricted near the apex; dorsum densely punctured, each puncture with a greyish seta, which condensed in front of scutellum. Scutellum oval, densely covered with greyish setae.

Elytra 1.7-1.9 times as long as wide, widest at apical one-third, scarcely narrowed basally, with weak subapical callus; each interval with a row of greyish fine setae.

Legs clothed with greyish setae; fore and middle femora with a very minute tooth; fore tibiae dilated near the middle.

Aedeagus with median lobe strongly curved at the apex.

Length: 3.6-4.4 mm.

Specimens examined: 100 exs., Hokkaido (Nopporo, Tokachi, Ashoro, Nibushi, Oshima), Iwate (Mitsuisi); Akita ("Chokai-mura"); Fukushima (Minamiizu); Tochigi (Mt. Nantai, Mt.

Hotaka), Tokyo (Okutama, Hikawa), Yamanashi (Hirogawara), Niigata (Tsugawa, Gatsugi, Iwafune, Sekida-toge, Yoshigahira, Tagai, Kangawa); Ishikawa (Mt. Hakusan); Shizuoka (Umegashima, Gotenba); Kyoto (Kibune, Ohmi, Ohara); Ehime (Mt. Iwaguroyama, Omogokei); Tottori (Mt. Daisen); Hiroshima (Yoshiwa-mura, Mt. Kanmuri); Fukuoka (Mt. Takasuyama, Mt. Hikosan); Ohita (Mt. Sobo); Kumamoto (Izumimura).

Distribution: Japan (Hokkaido, Honshu, Shikoku, Kyushu); Siberia.

Biological note: The adults were captured on *Acer* spp. from May to July, and by sifting litter in winter. Some were emerged from the seeds of *Acer* mono (Itayakaede in Japanese).

ACKNOWLEDGEMENTS

We wish to express our sincere thanks to the following entomologists for their kindness in offering materials: K. Baba, M. Ejima, H. Hiramatsu, T. Hanatani, H. Irie, S. Kimoto, H. Maki-hara, M. Masumoto, Y. Miyatake, S. Miyakawa, S. Miyamoto, K. Miyashita, A. Nagai, J. Nagao, T. Nohira, T. Nonaka, Y. Okushima, K. Shigematsu, M. Takahashi, T. Tsutsumi, S. Uéno, T. Ueno and K. Matsumoto. Kojima also thanks to Associate Prof. O. Tadauchi and Assistant Prof. S. Nomura of Kyushu University, Associate Prof. M. T. Chûjô of Hikosan Biological Laboratory, Kyushu University, Prof. N. Gokan, Prof. Y. Watanabe, and Assistant Prof. S. Okajima of Tokyo University of Agriculture for various cooperations for this work.

REFERENCES

- Angelov, P. A., 1980. *Fauna Bulgarica* 10. Coleoptera, Curculionidae, IV. 301 pp. Sofia. (In Russian).
- Blatchley W. S. and C. W. Leng, 1916, *Rhynchophora or Weevils of Northeastern America*, 682 pp. Nature Publ. Co., Indianapolis.
- Burke, H. R., 1976. Bionomics of the anthonomine weevils. *Ann. Rev. Ent.*, **21**: 283–303.
- Burke, H. R. and R. S. Anderson, 1989. Systematic of species of *Anthonomus* Germar previously assigned to *Tachypterellus* Fall and Cockerell (Coleoptera, Curculionidae). *Ann. Ent. Soc. Amer.*, **2**(4): 426–437.
- Burke, H. R. and M. Ahmad, 1967. Taxonomic status and relationship of *Coccotorus* Leconte and *Furcippus* Desbrochers (Coleoptera, Curculionidae). *Ann. Ent. Soc. Amer.*, **60**: 1152–1155.
- Chen, Y. Q., 1993. A new species of *Coccotorus* Leconte from China (Coleoptera, Curculionidae, Anthonominae). *Acta Ent. Sinica*, **36**(1): 74–76.
- Chevalier, M., P. Grisson, A. Hoffmann and A. S. Balachowsky, 1963. In Balachowsky, *Entomologie appliquée à l'Agriculture, I, Coléoptères Tome 2*: 1149–1188. Masson et Cie Éditeurs, Paris.
- Clark, W. E., 1987. Revision of the *Anthonomus* subgenus *Anthomorphus* Weise (Coleoptera, Curculionidae). *Quaest. Ent.*, **22**: 317–364.
- Desbrochers des Loges, M. J., 1868. Monographie des Balaninidae et Anthonomidae d'Europe et des confins méditerranéens. *Ann. Soc. Ent. Fr.*, **4**(8): 331–368, 411–470.
- Dieckmann, L., 1968. Revision der westpaläarktischen Anthonomini. *Beitr. Ent.*, **18**: 377–564.
- , 1969. Nachtrag zur " Revision der westpaläarktischen Anthonomini (Coleoptera, Curcu-

- lionidae) ". *Beitr. Ent.*, 19: 679-682.
- , 1975. Neue vorder- und mittelasiatische Curculionidae. *Beitr. Ent.*, 25: 201-208.
- , 1988. Beiträge zur Insektenfauna der DDR: Curculioninae. *Beitr. Ent.*, 38: 365-468.
- Dietz, W. G., 1891. Revision of the genera and species of Anthonomini inhabiting North America. *Trans. Amer. Ent. Soc.*, 16: 177-276.
- Faust, J., 1891. Beiträge zur Kenntnis der Käfer des europäischen und asiatischen Russlands. *Horae Soc. Ent. Ross.*, 25: 386-416.
- Fukuda, J., 1951. *Kaju Gaichu*. 357 pp. Asakura Shoten, Tokyo. (In Japanese)
- Hatch, 1971. *The Beetles of the Pacific Northwest*. Univ. Wash. Publ. Biol., 16, 662 pp.
- Hirano, I., 1959. The list of Japanese references on insect. *Osaka Shokubutu Boeki*, VII: 422-472. (In Japanese)
- Hoffmann, A., 1954. *Faune de France*, 59 Coléoptères Curculionides. 2^o: 486-1208. P. Lechevalier, Paris.
- Katô, M., 1937. Egg-laying activity of *Anthonomus bisignifer*. *Seitaigaku Kenkyu*, III(3): 223.
- , 1938. Local Variations of *Anthonomus bisignifer*. *Ouyou Doubutsugaku Zasshi*, 10: 186-187.
- Kissinger, D. G., 1964. *Curculionidae of America North of Mexico. A key to genera*. 143 pp. Taxonomic Publ., South Lancaster, Mass.
- Kôno, H., 1935. Die Rüsselkäfer aus der Kurilen. *Ins. Mats.*, 9: 99-107.
- , 1939. Neue und wenig bekannte Käfer Japan VI. Gattung *Anthonomus* (Col. Curc.). *Ins. Mats.*, 13, 2&3: 1-6.
- , 1951. In Kôno et al., *Iconographia Insectorum Japonicorum*. 1738 pp. Hokuryukan, Tokyo. (In Japanese)
- Kôno, H. and H. Kim, 1937. Kurculioj de Koreujo. *J. Chosen Nat. Hist. Soc.*, 22: 9-31. (In Japanese)
- Kwon, Y. J. & S. Lee, 1986. Check list of Weevils from Korea (Coleoptera, Curculionidae). *hs. Koreana*, 6: 57-89.
- Lacordaire, T., 1863. *Genera des Coléoptères*. VI: 1-637. Paris.
- Leconte, C. J. and G. H. Horn, 1876. The Rhynchophora of Northeastern America. *Proc. Amer. Phil. Soc.*, 15: 1-455.
- Matsumoto, K., 1983. A new anthonomine weevil injures apple. *Shokubutsu Boeki*, 37(6): 249. (In Japanese)
- Matsumura, S., 1931. *Illustrated Common Insects of Japan*, III, 183 pp, 29 col. pls. (In Japanese)
- , 1931. 6000 *Illustrated Insects of Japan-Empire*, 1497 pp. (In Japanese)
- Morimoto, K., 1960. New records of the subfamily Anthonominae from Japan. *Kontyû*, 28: 115. (In Japanese)
- , 1962. Key to subfamilies, tribes and genera of the superfamily Curculionoidea of Japan excluding Scolytidae, Platypodidae and Cossoninae. *J. Fac. Agr., Kyushu Univ.*, 12: 21-66.
- , 1984. Curculionidae, In Hayashi, M., Morimoto, K., and Kimoto, S., *Coleoptera of Japan in Colour*, IV: 489 pp., 72 col. pls., Hoikusha, Osaka. (In Japanese)
- Morimoto K. and H. Kojima, 1994. Notes on the Curculionidae from Taiwan. 1. *Tachypterellus*. *Mem. Issue of the late Dr. K. Baba*. (In press)
- , 1994. On the systematic position of the genus *Euphyllobiomorphus*: an adelognathous weevil with cylindrical rostrum. *Esakia*, (34): 131-146.
- Morimoto, K. and C. E. Lee, 1992. Curculionidae from Cheju Island, Korea, with description of three new species (Insecta, Coleoptera). *Esakia*, (32): 1-18.

- Morimoto, K. and S. Miyakawa, 1985. Weevil fauna of the Izu Islands, Japan (Coleoptera). *Mushi*, **50**(3): 19-85.
- Nakane, T., 1963. Curculionidae. In Nakane et al., *iconographia Insectorum Japonicorum Color-e Naturali Edita*, II. 443 pp., 192 col. pls. Hokuryukan, Tokyo. (In Japanese)
- Penecke, K. A., 1926. Die europ. Arten der Gattung *Bradybatus* Germ. (Col. Curc.). *Wien. Ent. Zeit.*, **43** (1): 1-6.
- Reitter, E., 1912. Bestimmungs-Schlüssel für die Unterfamilien, Tribus und Gattungen der Curculionidae. *Verh. nat. Verein, Brünn*, LI (Best.-Tab., LXVIII): 1-90.
- , 1916. *Fauna Germanica, Die Käfer des Deutschen Reiches*, V. 343 pp. Stuttgart.
- Roelofs, W., 1874-75. Curculionides recueillis au Japon par M. G. Lewis. *Ann. Soc. Ent. Belg.*, **17**: 121-176, 1874; **18**: 149-193, 1875.
- Schenkling, S. and G. A. K. Marshall, 1934. *Coleopterorum Catalogus*, Curculionidae, 139 Anthonominae, 82 pp. 's-Gravenhage.
- Schoenherr, C. J., 1826. *Curculionidum Dispositio Methodica*, 338 pp. Lipsiae.
- , 1836. *Genera et Species Curculionidum*, 3, 1.505 pp. Parisiis.
- Smrecynski, S., 1972. *Klucze do Oznaczania Owadów Polski*, XIX. Coleoptera, 98d, Curculionidae: Curculioninae. 19.5 pp. Warszawa. (In Polish)
- Ter-Minassian, M. E., 1936. Übersicht der *Anthonomus*- und *Furcipes*-Arten der Fauna der UdSSR (Coleoptera, Curculionidae). *Trav. Inst. Zool. Acad. Sci. URSS.*, **3**: 165-182. (In Russian)
- , 1946. A new *Bradybatus* from Armenia (Coleoptera, Curculionidae). *Dokl. Akad. Nauk Armjansk SSR*, **IV**(2): 55-57.
- , 1954. Neue und wenig bekannte Rüsselkäfer (Coleoptera, Curculionidae), gefunden in der tadshikischen SSR. *Dokl. Akad. Nauk Armjansk SSR*, **18**: 57-58. (In Russian)
- , 1960. Neue und wenig bekannte Rüsselkäfer (Coleoptera, Curculionidae), gefunden in der tadshikischen SSR. *Dokl. Akad. Nauk Tadshik SSR*, **3**: 41-43. (In Russian)
- , 1972. New Palearctic species of the genus *Anthonomus* (Coleoptera, Curculionidae). *Zool. Zh.*, **2**: 304-306. (In Russian)
- Thomson, C. G. 1895. *Skandinaviens Coleoptera, Synoptisk Dearbetade. I*, 290 pp. Lund.
- Voss, E., 1944. Anthonominen-Studien (Col. Curc.). *Stett. Ent. Zeit.*, **105**: 34-51.
- , 1953. Über einige in Fukien (China) gesammelte Rüssler, 4 (Col. Curc.). *Ent. Blätt.*, **49**: 42-82.
- , 1958. Ein Beitrag zur Kenntnis der Curculioniden im Grenzgebiet der orientalischen zur paläarktischen Region (Col. Curc.), *Decheniana, Beihefte* **5**: 1-140.
- , 1962. Attelabidae, Apionidae, Curculionidae. *Exp. Pare. Nat. Upemba, Mission G. F. de Witte*. 44: 380 pp. Bruxelles.
- Voss, E. and M. Chûjô, 1960. Curculionid-beetles of Niigata Prefecture, Honshu, Japan, collected by Dr. K. Baba (IV). *Niponius*, **1**(3): 3-6.
- Yuasa, K., 1932. Curculionidae. In Yuasa et al., *Nippon Konchu Zukan*, 2241 pp. Hokuryukan, Tokyo. (In Japanese)

Explanations of Figures 1-107

1-18: Head and prothorax of *Anthonomus* and *Bradybatus* spp., lateral.

1: *A. pomorum*, ♂. 2: *A. undulatus*, ♀. 3: *A. alni*, ♂. 4: *A. miyakawai*, ♀. 5: *A. uenoi*, ♂. 6: *A. bisignifer*, ♂. 7: *A. ryukyuensis*, ♂. 8: *A. takahashii*, ♂. 9: *A. terreus*, ♂. 10: *A. okumai*, ♂. 11: *A. yuasai*, ♂. 12: *A. minor*, ♂. 13: *A. aino*, ♂. 14: *A. varians*, ♂. 15: *A. dorsalis*, ♂. 16: *A. rectirostris*, ♂. 17: *B. sharpi*, ♂. 18: *B. limbatus*, ♂.

19-35: Antenna of *Anthonomus* and *Bradybatus* spp. 19: *A. pomorum*, ♂. 20: *A. undulatus*, ♀. 21: *A. miyakawai*, ♀. 22: *A. uenoi*, ♂. 23: *A. bisignifer*, ♂. 24: *A. ryukyuensis*, ♂. 25: *A. mali*, ♂. 26: *A. terreus*, ♂. 27: *A. minor*, ♂. 28: *A. okinawanus*, ♂. 29: *A. okumai*, ♂. 30: *A. aino*, ♂. 31: *A. yuasai*, ♂. 32: *A. varians*, ♂. 33: *A. dorsalis*, ♂. 34: *A. rectirostris*, ♂. 35: *B. sharpi*, ♂.

36-49: Fore leg of *Anthonomus* and *Bradybatus* spp.

36: *A. pomorum*, ♂. 37: *A. undulatus*, ♀. 38: *A. alni*, ♂. 39: *A. miyakawai*, ♀. 40: *A. uenoi*, ♂. 41: *A. mali*, ♂. 42: *A. bisignifer*, ♂. 43: *A. yuasai*, ♂. 44: *A. aino*, ♂. 45: *A. dorsalis*, ♂. 46: *A. varians*, ♂. 47: *A. rectirostris*, ♂. 48: *B. sharpi*, ♂. 49: *B. limbatus*, ♂.

50-53: Apex of hind tibiae of *Anthonomus* and *Bradybatus* spp.

50: *A. pomorum*, ♂. 51: ditto, ♀. 52: *A. terreus*, ♂. 53: *B. sharpi*, ♂.

54-58: Tergite of *Anthonomus* and *Bradybatus* spp.

54: *A. varians*, ♀. 55: *A. bisignifer*, ♂. 56: *A. dorsalis*, ♀. 57: *A. rectirostris*, ♂. 58: *B. sharpi*, ♂.

59, 60: Metendosternite of *Anthonomus* and *Bradybatus* spp.

59: *A. pomorum*, ♂. 60: *B. limbatus*, ♂.

61-63: Female genitalia and spermatheca of *Anthonomus* and *Bradybatus* spp.

61: *A. terreus*. 62: *A. rectirostris*. 63: *B. sharpi*.

64, 65: Hind wing of *Anthonomus* and *Bradybatus* spp.

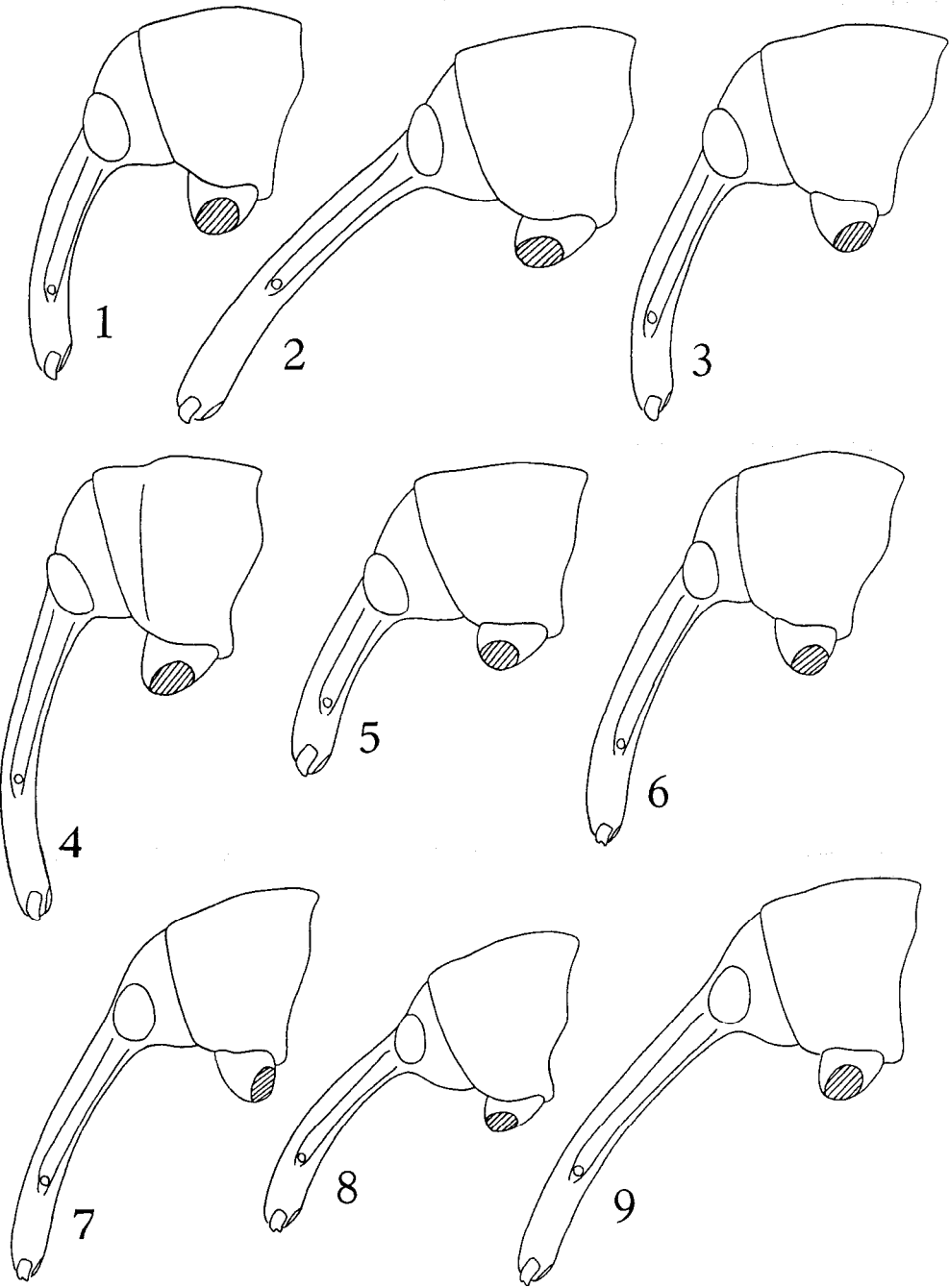
64: *A. pomorum*. 65: *B. limbatus*.

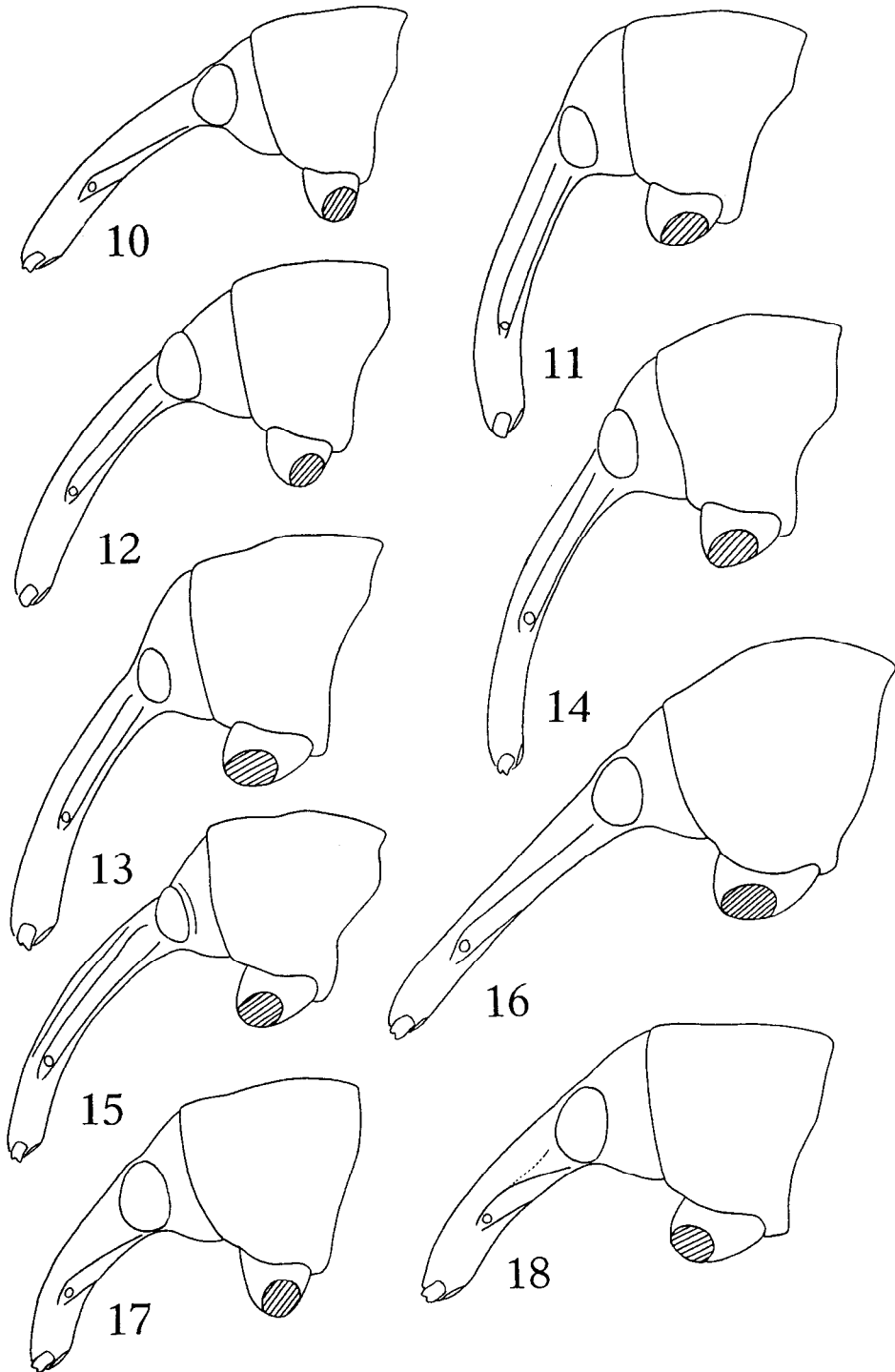
66-82: Male genitalia of *Anthonomus* and *Bradybatus* spp.

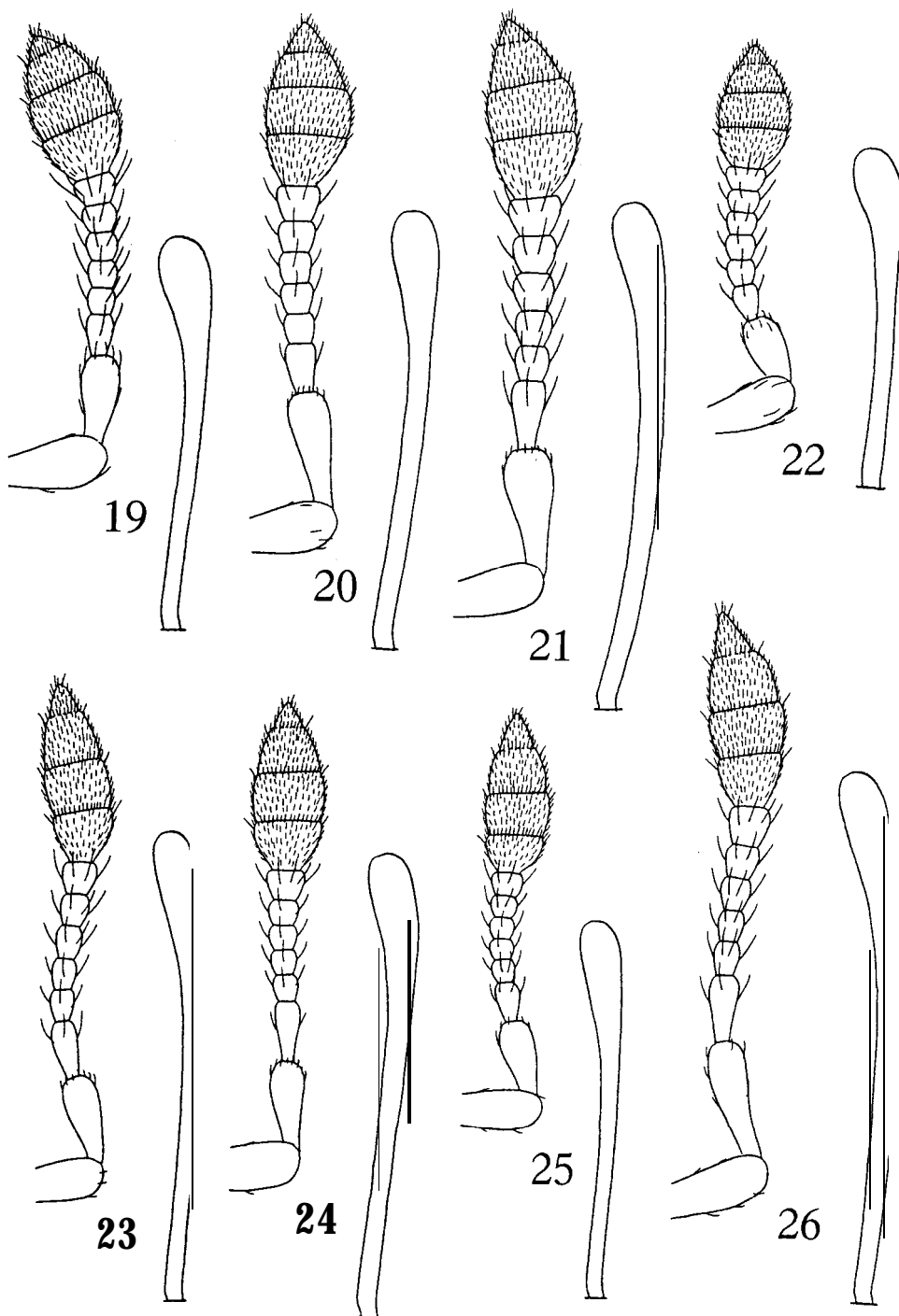
66: *A. pomorum*. 67: *A. alni*. 68: *A. uenoi*. 69: *A. bisignifer*. 70: *A. ryukyuensis*. 71: *A. mali*. 72: *A. terreus*. 73: *A. minor*. 74: *A. okumai*. 75: *A. okinawanus*. 76: *A. yuasai*. 77: *A. aino*. 78: *A. varians*. 79: *A. rectirostris*. 80: *A. dorsalis*. 81: *B. sharpi*. 82: *B. limbatus*.

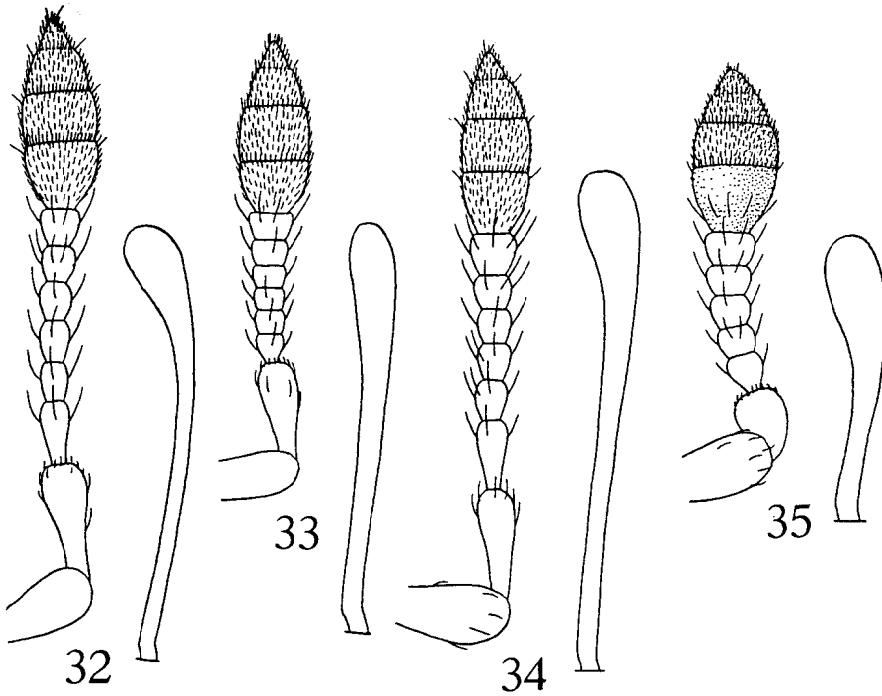
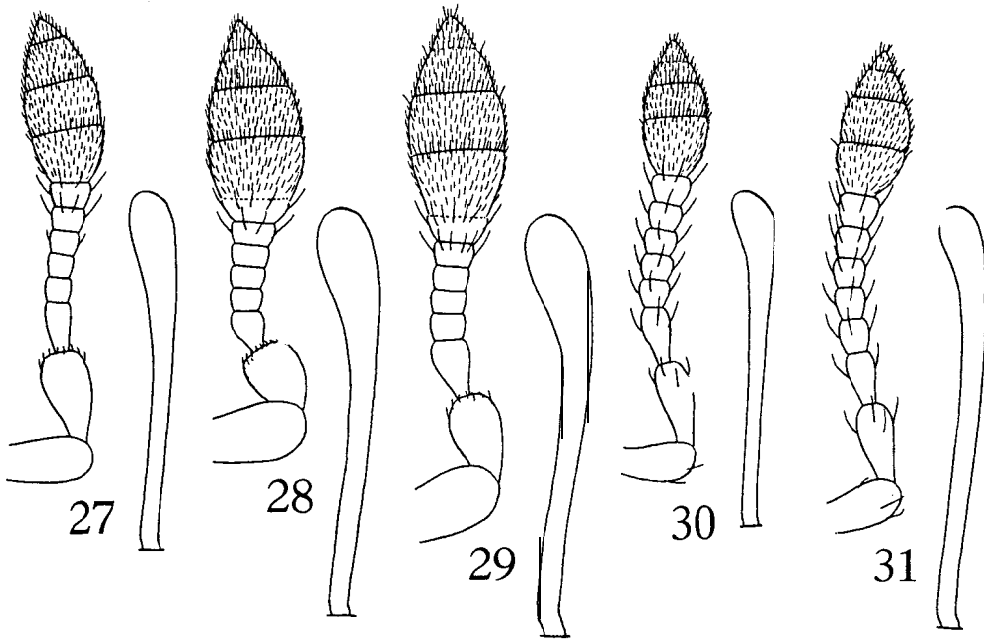
83-107: Dorsal view of *Anthonomus* and *Bradybatus* spp.

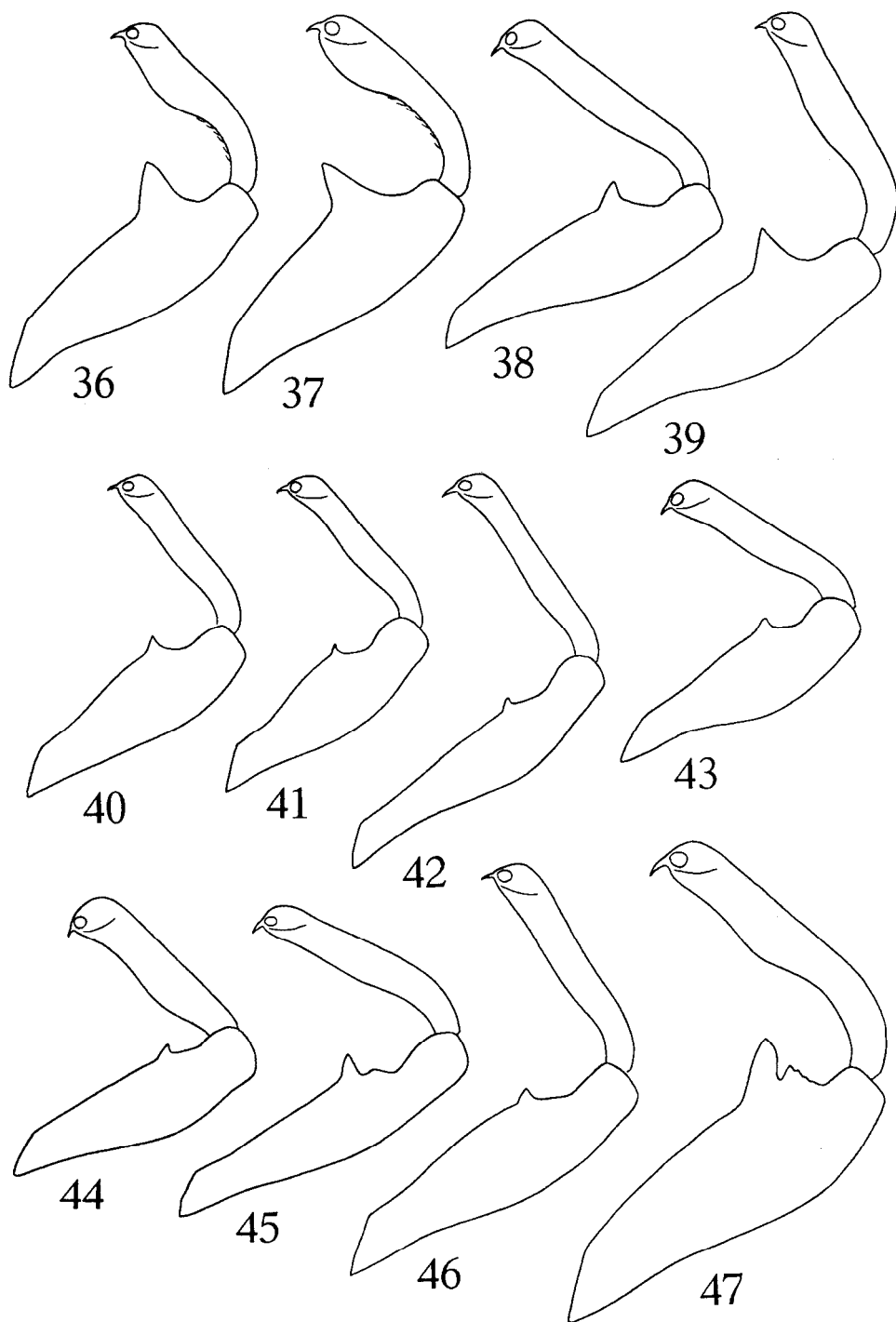
83: *A. pomorum*, ♂. 84: *A. undulatus*, ♀. 85: *A. miyakawai*, ♀. 86: *A. alni*, ♂. 87: *A. uenoi*, ♂. 88, 89: *A. bisignifer*, ♂. 90: *A. ryukyuensis*, ♂. 91: *A. takahashii*, ♂. 92: *A. mali*, ♂. 93: *A. terreus*, ♂. 94: *A. minor*, ♂. 95: *A. okumai*, ♂. 96: *A. okinawanus*, ♂. 97, 98: *A. aino*, ♂. 99, 100: *A. yuasai*. 101, 102: *A. varians*, ♂. 103: *A. dorsalis*, ♂. 104: *A. rectirostris*, ♂. 105: *B. sharpi*, ♂. 106-107, *B. limbatus*, ♂.

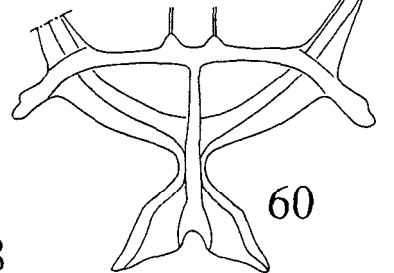
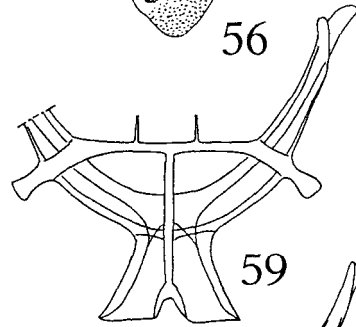
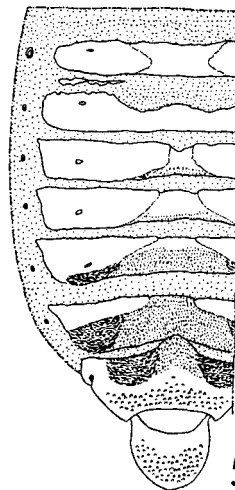
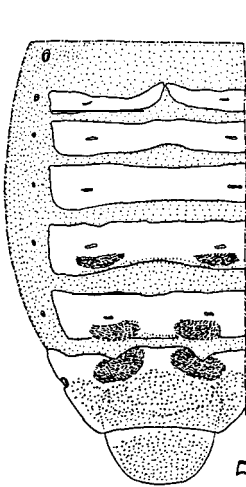
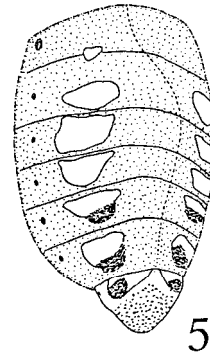
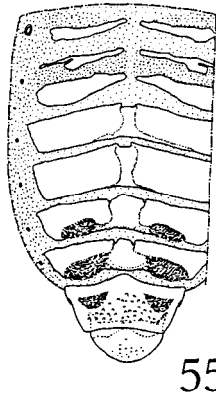
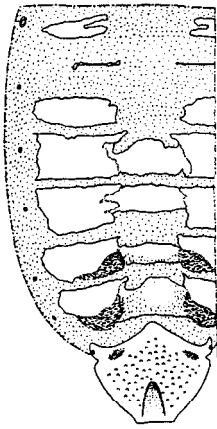
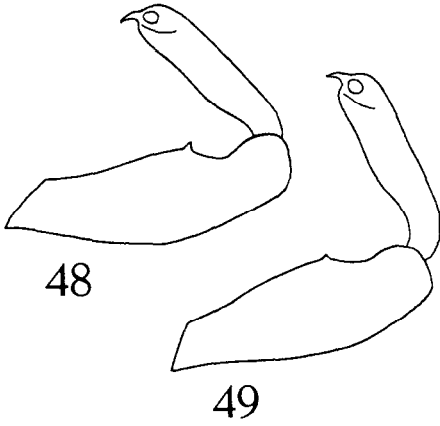


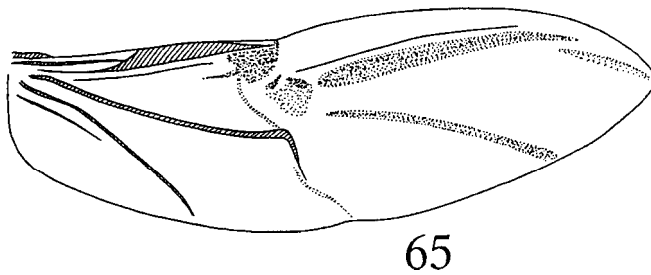
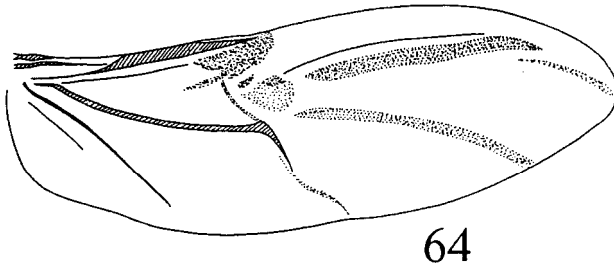
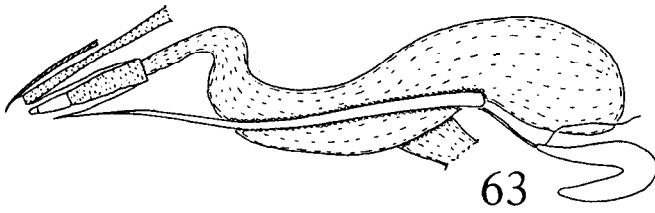
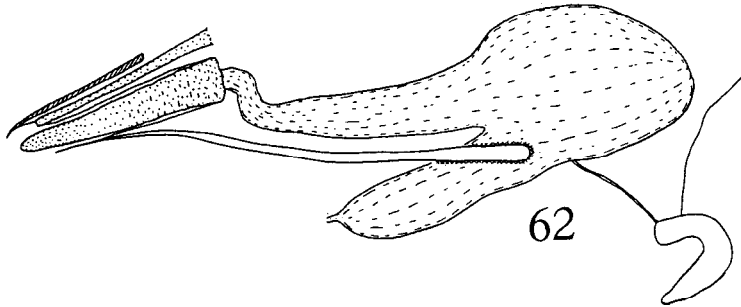
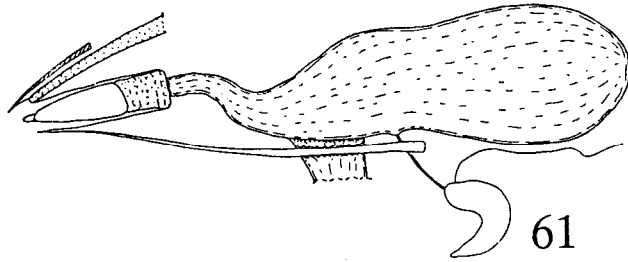


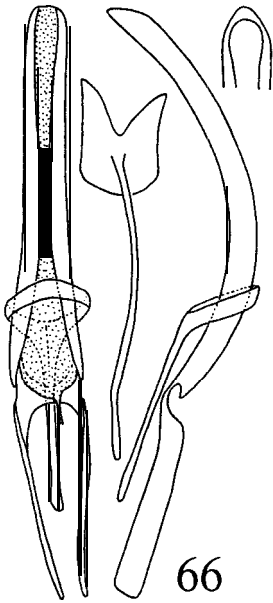




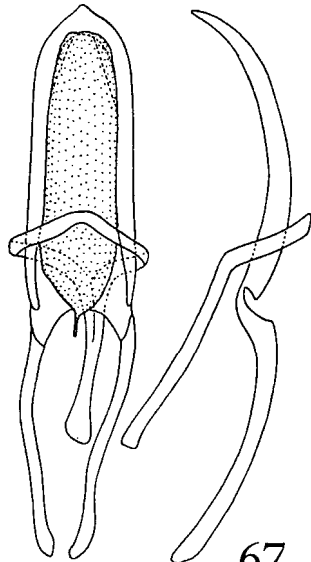




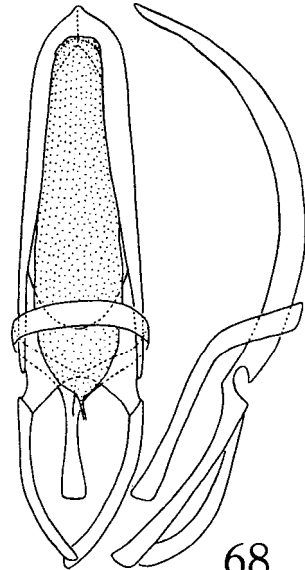




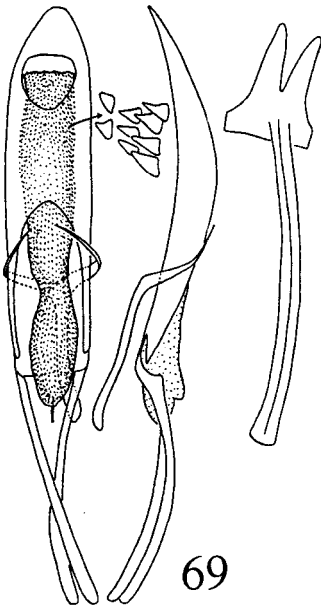
66



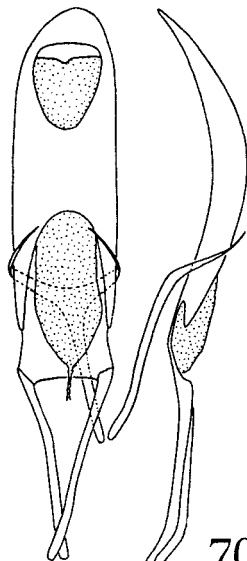
67



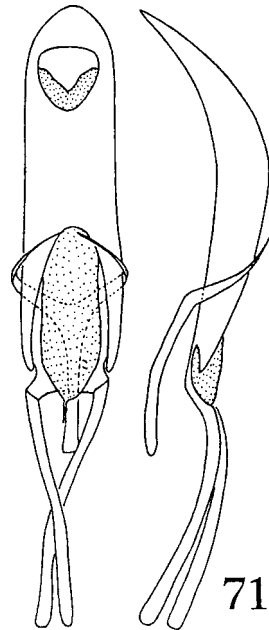
68



69



70



71

